



ICAO

Circular 347

Aircraft Tracking Implementation Guidelines

For Operators and Civil Aviation Authorities



Approved by and published under the authority of the Secretary General

INTERNATIONAL CIVIL AVIATION ORGANIZATION



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INTERNATIONAL CIVIL AVIATION ORGANIZATION

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GLOSSARY

ACRONYMS AND ABBREVIATIONS

4D	Four-dimensional
ACARS	Aircraft communications addressing and reporting system
ADS	Automatic dependent surveillance
ADS-B	Automatic dependent surveillance – broadcast
ADS-C	Automatic dependent surveillance – contract
AIP	Aeronautical Information Publications
ANP	Air navigation plan
ANSP	Air navigation service provider
AOC	Air operator certificate
ASG	Area specific guidance
ATC	Air traffic control
ATM	Air traffic management
ATS	Air traffic services
ATSU	Air traffic services unit
EPIRB	Emergency position-indicating radiobeacon station
FIR	Flight information region
FOO	Flight operations officer/flight dispatcher
GADSS	Global Aeronautical Distress and Safety System
IFE	In-flight entertainment systems
LRCS	Long-range communication system
MEL	Minimum equipment list
NATII	Normal aircraft tracking implementation initiative
OFP	Operational flight plan
RCC	Rescue coordination centre
SAR	Search and rescue
SARPs	Standards and Recommended Practices
SATCOM	Satellite communications
SELCAL	Selective calling system
SMS	Safety management system
SOP	Standard operating procedures
TTX	Table top exercise
USOAP	Universal Safety Oversight Audit Programme
WPR	Waypoint position reporting

DEFINITIONS

Aircraft tracking. A process, established by the operator, that maintains and updates, at standardized intervals, a ground-based record of the four dimensional position of individual aircraft in flight. (Annex 6, Part I, Section 3.5, Aircraft tracking).

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). (Annex 11, Chapter 1, Definitions).

4D/15 service. In the provision of air traffic services an ATS unit receives four-dimensional (latitude, longitude, altitude, time) position information at 15-minute intervals or less from suitably equipped aircraft.

4D/15 tracking. The operator obtains four-dimensional (latitude, longitude, altitude, time) aircraft position information at 15-minute intervals or less.

Flight operations officer/flight dispatcher. A person designated by the operator to engage in the control and supervision of flight operations, whether licensed or not, suitably qualified in accordance with Annex 1 — *Personnel Licensing*, who supports, briefs and/or assists the pilot-in-command in the safe conduct of the flight. (Annex 6, Part I, Chapter 1, Definitions).

Flight plan. Specified information provided to air traffic services units, relative to an intended flight or portion of a flight of an aircraft. (Annex 6, Part I, Chapter 1, Definitions).

Oceanic area. Airspace which overlies waters outside the territory of a State.

Operational control. The exercise of authority over the initiation, continuation, diversion or termination of a flight in the interest of the safety of the aircraft and the regularity and efficiency of the flight (Annex 6, Part I, Chapter 1, Definitions).

Operational control personnel. Flight operations officers, flight dispatchers or other appropriately trained individuals designated by the operator to engage in the control and supervision of flights and/or be assigned operational control responsibilities, duties, or tasks.

Operational flight plan. The operator's plan for the safe conduct of the flight based on considerations of aeroplane performance, other operating limitations and relevant expected conditions on the route to be followed and at the aerodromes concerned. (Annex 6, Part I, Chapter 1, Definitions).

Note 1.— Information relevant to determining the extent that waters form part of the territorial sea may be found in the United Nations Convention on the Law of the Sea.

Note 2. — Definitions unique to this circular do not contain a source reference annotation.

REFERENCES

United Nations Convention on the Law of the Sea

ICAO documents

Annex 1 — Personnel Licensing

Annex 6 — Operation of Aircraft, Part I — International Commercial Air Transport — Aeroplanes

Annex 11 — Air Traffic Services

Annex 15 — Aeronautical Information Services

Annex 19 — Safety Management

Global Aeronautical Distress and Safety System (GADSS) – Concept of Operations – Version 5.12 Draft

Training Manual, Part D-3 — Flight Operations Officers/Flight Dispatchers (Doc 7192)

Manual of Procedures for Operations Inspection, Certification and Continued Surveillance (Doc 8335)

Safety Management Manual (SMM) (Doc 9859)

Chapter 1

INTRODUCTION

1.1 BACKGROUND

1.1.1 Following the loss of Malaysian Airlines flight MH370, a special multidisciplinary meeting on global flight tracking (MMGFT) was held at the Headquarters of the International Civil Aviation Organization (ICAO) on 12 and 13 May 2014. Participants included States represented on the ICAO Council and States having nominated members to the Air Navigation Commission, as well as representatives of industry and ICAO panels. The participants in the meeting were invited to explore, among other things:

- a) the need and means available to track all airline flights;
- b) the need for ICAO guidance on global aircraft tracking; and
- c) the potential for strengthening ICAO provisions.

1.1.2 Upon completion of this special meeting, consensus was reached among Member States and representatives of the international air transport industry on a near-term strategy to track flights, regardless of their location or destination. The meeting also established a Global Aeronautical Distress and Safety System (GADSS) framework for future medium- and long-term efforts.

1.1.3 Subsequent to the special meeting, a "concept of operations" on aircraft tracking was drafted, which defined the roles and responsibilities of all the stakeholders and the objectives of aircraft tracking, in order to ensure the timely provision of information to the appropriate personnel to support search and rescue (SAR), and recovery and accident investigation activities. A final high-level concept of operations was delivered at the Second ICAO High-level Safety Conference (HLSC 2015), held from 2 to 5 February 2015 at ICAO Headquarters.

1.1.4 The HLSC 2015 produced several recommendations on finalizing aircraft tracking Standards and Recommended Practices (SARPs) and related guidance material. Recognizing the compelling need for a routine aircraft tracking solution in the short term, as determined by the MMGFT and supported by the HLSC 2015, proposed the expeditious implementation of routine aircraft tracking.

1.1.5 To achieve this, the Normal Aircraft Tracking Implementation Initiative (NATII) was formed on 19 February 2015. It was tasked with leading a multinational implementation initiative designed to demonstrate best use of present-day equipment and integrate the outcome into guidance material. The initiative would include, but not be limited to, operator flight monitoring, air traffic services (ATS), SAR and civil/military cooperation. Additionally, the HLSC 2015 agreed that planning of the activities should begin shortly after the conference and conclude by 31 August 2015 in order to enhance the guidance material used to advance aircraft tracking procedures.

1.2 PURPOSE

1.2.1 The SARPs in ICAO's Annex 6 — *Operation of Aircraft*, Part I — *International Commercial Air Transport — Aeroplanes*, Section 3.5 were adopted by the Council to expedite the implementation of a near-term and routine aircraft tracking solution. This circular was developed as part of the NATII and is intended to support the implementation of operator aircraft tracking policies, processes and procedures. Its purpose is to provide Information for regulators and operators on how to implement the SARPs, which will become applicable on 8 November 2018.

1.2.2 The information contained in this circular is based on current industry best practices and on the use of readily available or emerging technologies. It is intended to support the uniform implementation of the aircraft tracking SARPs and complies with the Recommendations of the Second ICAO High-level Safety Conference (HLSC 2015).

Chapter 2

AIRCRAFT TRACKING REQUIREMENTS

2.1 INTRODUCTION

2.1.1 Routine aircraft tracking under normal conditions is a core component of GADSS. Aircraft tracking is a near-term objective of GADSS. It is the first step necessary to move from current systems towards the GADSS target concept, which addresses the growing consensus in the global aviation community that the location of an aircraft should always be known. Aircraft tracking is a near-term solution intended to leverage existing technologies to:

- a) assist in the timely identification and location of aircraft;
- b) reduce the reliance on the procedural methods used for determining aircraft position;
- c) help to ensure the availability and sharing of accurate aircraft position data (with the relevant entities); and
- d) help to improve the effectiveness of air traffic services unit (ATSU) alerting and support SAR.

2.1.2 One objective of the aircraft tracking SARPs is to set an automated four-dimensional position reporting interval of 15 minutes or less (recommended in all areas of operation and required in oceanic areas). This standardized reporting interval is intended to ultimately reduce the time necessary to resolve the status of an aircraft or, when necessary, help to locate an aircraft.

2.1.3 The SARPs also allow stakeholders to meet tracking requirements using available and planned technologies and procedures, as necessary. In general, the SARPs:

- a) do not introduce any changes to current air traffic control (ATC) procedures;
- b) establish operator responsibilities for tracking their aircraft based on areas of operation;
- c) are not technology specific; and
- d) establish communication protocols between the operator and ATC.

Note 1.— Except as provided in Annex 6, Part I, 4.6.1 (c), aircraft tracking in accordance with Annex 6, Part I, 3.5 is not required for the safe conduct of a flight.

Note 2.— This circular provides guidance to supplement broader State requirements related to the operation and operational control of a particular flight or series of flights. In all cases, however, operators remain responsible for ensuring that their personnel comply with the laws, regulations and procedures of those States in which operations are conducted in accordance with Annex 6, Part I, 3.1.1.

2.2 UNDERSTANDING THE AIRCRAFT TRACKING SARPS

2.2.1 The SARPs introduced in Annex 6, Part I, Amendments 39 and 42 define aircraft tracking provisions that encompass operator responsibilities related to establishing the following:

- a) processes to maintain a ground-based record of the position of individual aircraft in flight and that underlie all aircraft tracking SARPs (Annex 6, Part I, 3.5.1);
- b) automated aircraft position determination and tracking interval recommended in all areas of operation (Annex 6, Part I, 3.5.2);
- c) automated aircraft position determination and tracking interval required in oceanic areas (Annex 6, Part I, 3.5.3);
- d) tracking data retention requirements (Annex 6, Part I, 3.5.5);
- e) risk assessment process required when a flight or series of flights will commence when a recommended or required automated reporting interval is unachievable (Annex 6, Part I, 3.5.4); and
- f) ground-based flight monitoring and ATSU notification requirements (Annex 6, Part I, 4.6.1).

Note.— Refer to Definitions for the terms 4D/15 service and 4D/15 tracking. These terms are used extensively throughout this circular as a form of shorthand to identify the entity responsible for receiving or obtaining 4D aircraft position data.

2.2.2 The remainder of this chapter will explain the SARPs in general terms to help give operators a basic understanding of aircraft tracking under normal conditions. It will also assist in the practical application of the SARPs, a subject that is addressed in greater detail in subsequent chapters.

2.2.3 Annex 6, Part I, 3.5.1 states:

3.5.1 The operator shall establish an aircraft tracking capability to track aeroplanes throughout its area of operations.

2.2.3.1 The principal intent of this SARP is to ensure that operators develop and implement the operational control capability to track their aeroplanes throughout the area(s) of operations defined in the air operator certificate (AOC) and related operations specifications. This aircraft tracking capability is defined in Annex 6, Part I and is applicable to operators of aircraft engaged in commercial air transport operations. It refers to a capability that maintains and updates, at standardized intervals, a ground-based record of the position of individual aircraft commensurate with their intended operations.

2.2.3.2 This SARP and its interrelationships with the subsequent aircraft tracking SARPs needs to be understood so as to ensure the uniform implementation of any aircraft tracking capability. In addition to the principal intent described in the preceding paragraph, it is important to note that Annex 6, Part I, 3.5.1:

- a) establishes an aircraft tracking capability for operators of all commercial air transport aircraft, although it is particularly applicable to those not already encompassed by the aircraft tracking specifications of Annex 6, Part I, 3.5.2 and 3.5.3. The complexity of this capability would be commensurate with the complexity, breadth and scope of the operations conducted by the operator;
- b) is typically considered a baseline operational control capability that can facilitate the implementation of additional aircraft tracking capabilities defined in Annex 6, Part I, 3.5.2 and 3.5.3. An assessment of

this baseline capability, by the operator, is usually the starting point for the aircraft tracking implementation activities detailed in Chapter 3;

- c) does not impose additional aircraft tracking requirements on operators already in conformity with Annex 6, Part I, 3.5.2 and 3.5.3;
- d) requires that a ground-based record of aircraft position data be maintained by the operator at "standardized" intervals. A specific interval, however, is not defined and is at the discretion of the operator and/or their civil aviation authority (CAA);
- e) does not require that aircraft tracking data be obtained through automated reporting; and
- f) ensures aircraft tracking data are obtained for retention by the operator and to assist SAR in accordance with Annex 6, Part I, 3.5.5.

Note 1.— Annex 6, Part I, 3.5.1 does not specifically refer to a "ground-based record" or "4-dimensional position data". These elements are derived from the definition of aircraft tracking in Annex 6, Part I, Chapter 1.

Note 2.— Refer to Definitions for the Annex 6, Part I definition of aircraft tracking and operational control.

2.2.4 Annex 6, Part I, 3.5.2 states:

3.5.2 Recommendation.— *The operator should track the position of an aeroplane through automated reporting at least every 15 minutes for the portion(s) of the in-flight operation(s) under the following conditions:*

- a) *the aeroplane has a maximum certificated take-off mass of over 27 000 kg and a seating capacity greater than 19; and*
- b) *where an ATS unit obtains aeroplane position information at greater than 15-minute intervals.*

Note.— See Annex 11, Chapter 2, for coordination between the operator and air traffic service providers regarding position report messages.

2.2.4.1 This recommends that aeroplane 4-dimensional (4D) position information be obtained using automated reporting means at 15-minute intervals or less. It is important to note that this is a recommended practice applicable in all areas of operations defined in the air operator certificate (AOC) and related operations specifications. Given the low take-off mass threshold, it is applicable to a wide range of aircraft.

2.2.4.2 This SARP is intended to expand the aircraft tracking capability defined by 3.5.1, as it specifies a standardized automated reporting interval. It also encompasses areas that are not addressed by the specifications of 3.5.3. Like 3.5.3, however, it relies on aircraft position data being obtained (by the operator) through automated reporting. This is intended specifically to preclude a negative impact (from a human-factor perspective) on the workload of the flight crew members.

2.2.4.3 The term "4D/15 service" is used when an aircraft is in an area where position information is received by an ATSU. The term "4D/15 tracking" is used when such information is obtained by the operator. The premise is that automatically capturing aircraft position data, either by an ATSU or the operator, can be used to fulfil aircraft tracking recommendations or requirements. In other words, an operator may suspend its own 4D/15 tracking in areas where 4D/15 service is available, although aircraft tracking in accordance with Annex 6, Part I, 3.5.1 remains applicable.

Note.— Although 3.5.2 is a recommended practice, to avoid duplication, much of the guidance with respect to an operator's responsibility to obtain aircraft position information is identical to the guidance provided for 3.5.3.

2.2.5 Annex 6, Part I, 3.5.3 states:

3.5.3 The operator shall track the position of an aeroplane through automated reporting at least every 15 minutes for the portion(s) of the in-flight operation(s) that is planned in an oceanic area(s) under the following conditions:

- a) the aeroplane has a maximum certificated take-off mass of over 45 500 kg and a seating capacity greater than 19; and
- b) where an ATS unit obtains aeroplane position information at greater than 15-minute intervals.

Note 1.— Oceanic area, for the purpose of aircraft tracking, is the airspace which overlies waters outside the territory of a State.

Note 2.— See Annex 11, Chapter 2, for coordination between the operator and air traffic services providers regarding position report messages.

2.2.5.1 In contrast to the Recommendation in 3.5.2, 3.5.3 establishes a required automated reporting interval applicable to aeroplanes that is to be maintained in oceanic areas either by the operator or by the relevant ATSU. In other words, 4D/15 tracking in accordance with 3.5.3 is applicable only in oceanic areas where a 4D/15 service is unavailable (e.g. when aircraft is not suitably equipped to allow an ATSU to receive its position data).

2.2.5.2 Conformance with this SARP requires the operator to determine, prior to flight commencement, whether an aircraft can participate in an available 4D/15 service or whether 4D/15 tracking will be required (note the use of the word “planned” in 3.5.3 above). This means the operator would have a reasonable certainty of being able to meet aircraft tracking requirements by the time the planning stage for the flight was complete. It does not imply a requirement on the part of the ATSU to provide a 4D/15 service.

2.2.5.3 If a 4D/15 service or 4D/15 tracking becomes unavailable after flight commencement, there is no implied requirement for the operator to have a backup means for 4D/15 tracking. And, once airborne, if the aircraft operates outside of the planned route or area (e.g. unplanned diversion) and is unable to maintain a 4D/15 service or undertake 4D/15 tracking, the operation may continue.

Note.— Refer to Chapters 4 and 5 for additional pre-and post-flight commencement considerations.

2.2.6 Annex 6, Part I, 3.5.4 states:

3.5.4 Notwithstanding the provisions in 3.5.2 and 3.5.3, the State of the operator may, based on the results of an approved risk assessment process implemented by the operator, allow for variations to automated reporting intervals. The process shall demonstrate how risks to the operation resulting from such variations can be managed and shall include at least the following:

- a) capability of the operator's operational control systems and processes, including those for contacting ATS units;
- b) overall capability of the aeroplane and its systems;
- c) available means to determine the position of, and communicate with, the aeroplane;
- d) frequency and duration of gaps in automated reporting;
- e) human factors consequences resulting from changes to flight crew procedures; and

- f) specific mitigation measures and contingency procedures.

Note.— Guidance on development, implementation and approval of the risk assessment process which allows for variations to the need for automatic reporting and the required interval, including variation examples, is contained in the Aircraft Tracking Implementation Guidelines (Cir 347).

2.2.6.1 The intent of this SARP is to define the criteria that would allow operators, based on the results of a specific risk assessment process, to vary from the automated reporting requirement and associated interval(s) specified in Annex 6, Part I, 3.5.2 and/or 3.5.3. The SARP should only be used as a means to cover specific situations where the technical challenges/limitations or the level of exposure may not support or warrant 4D/15 tracking.

2.2.6.2 The SARP is neither an alternative to compliance with aircraft tracking provisions nor does it relieve operators of the responsibility to track their aircraft. It simply defines a risk-based methodology that allows for the commencement of a flight or series of flights when the recommended or required automated reporting interval is not achievable in accordance with either 3.5.2 or 3.5.3.

2.2.6.3 Some of the circumstances when this SARP is envisaged to be applied include the following singular (e.g. one-off) or long-term (e.g. continual) scenarios:

- a) aircraft equipment failure prior to dispatch (commencement) rendering 4D/15 tracking unserviceable;
- b) systemic (non-aircraft dependent) failure rendering 4D/15 tracking unachievable;
- c) regular short exposure to lack of 4D/15 coverage (e.g. short A to B flights);
- d) temporary airspace closures that may force unequipped aircraft onto routes that would typically require 4D/15 tracking;
- e) technologically challenging areas (e.g. polar routes); and
- f) other scenarios where, subject to risk assessment results, the technical challenges or the level of exposure may not warrant or justify 4D/15 tracking.

2.2.6.4 The risk assessment process described by the SARP is intended to be strategic in nature and scope. It is not intended, for example, that a specific risk assessment be conducted on a flight-by-flight basis by operational control personnel or the flight crew. Rather, the risk assessment process would be used by the operator to develop mitigations that would be embedded in policy and procedure. This would, in turn, allow for flight commencement (dispatch) in accordance with the outcome of the process and resultant policy and procedure.

Note 1.— It is not intended that the State would have to review and approve each individual occasion when the risk assessment process was applied or a risk assessment conducted. The risk assessment process and related considerations are dealt with in detail in Chapter 4.

Note 2.— For the purpose of achieving conformity with this SARP, the specified risk management activities are applicable any time an operator accepts the 4D/15 tracking responsibility in accordance with either Annex 6, Part I, 3.5.2 or 3.5.3.

2.2.7 Annex 6, Part I, 3.5.5 states:

3.5.5 The operator shall establish procedures, approved by the State of the Operator, for the retention of aircraft tracking data to assist SAR in determining the last known position of the aircraft.