CIVIL AVIATION PUBLICATION

CAP 17

AUTOMATIC DEPENDANT SURVEILLANCE OPERATIONS

INDEX

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INDEX

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1. INTRODUCTION

1.1 ABS-B (Automatic Dependent Surveillance — Broadcast)

1.1.1 General

ADS-B is a surveillance technology incorporating both air and ground aspects. Compared to the current secondary surveillance radar system, ADS-B provides air traffic control (ATC) with a more accurate and frequent picture of the aircraft's position. ADS-B can be ADS-B OUT or ADS-B IN.
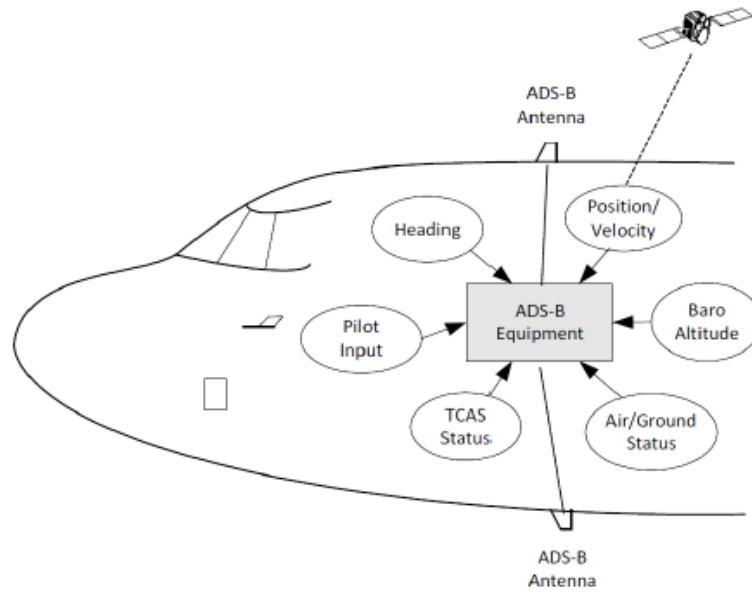
ADS-B is automatic because no external interrogation is required. It is dependent because it relies on the global navigation satellite system (GNSS) as its position source and broadcast transmission systems to provide surveillance information to ATC and other users.

ADS-B uses the same transponder as, but operates independently of, the aircraft radar and traffic collision alerting and avoidance (TCAS) systems. Most modern Mode S secondary surveillance radar (SSR) transponders are capable of transmitting SSR and ADS-B (also termed extended squitter) data. However Mode A/C and some older Mode S transponders do not support ADS-B.

Those countries that have implemented ADS-B utilise the Mode S frequency band of 1090 MHz—most commonly called ten-ninety ES (extended squitter).

1.1.2 References

(a)   ICAO Doc 9869 Performance Based Communications and Surveillance Manual

(b)   ICAO Doc 10037 Global Operational Data Link (GOLD) Manual

(c)   [Periodic updates are available on the following websites but operators are advised to check the AIP of the States to be flown.

    (1)   Universal Weather (USA) website
    https://www.universalweather.com/blog/ads-b-update/

    (2)   EASA website
    https://www.easa.europa.eu/newsroom-and-events/news/amendment-airspace-requirements-ads-b-and-mode-s

    (3)   CASA (Australia) website
    https://www.casa.gov.au/airspace/surveillance-communication-navigation-systems-and-air-traffic-management]

1.1.3 ADS-B OUT

Using ADS-B OUT equipment on board, the aircraft broadcasts its identification and the other information above. The ground portion comprises a network of ADS-B ground stations, which receive these broadcasts and direct them to ANS for presentation on a controller's display.
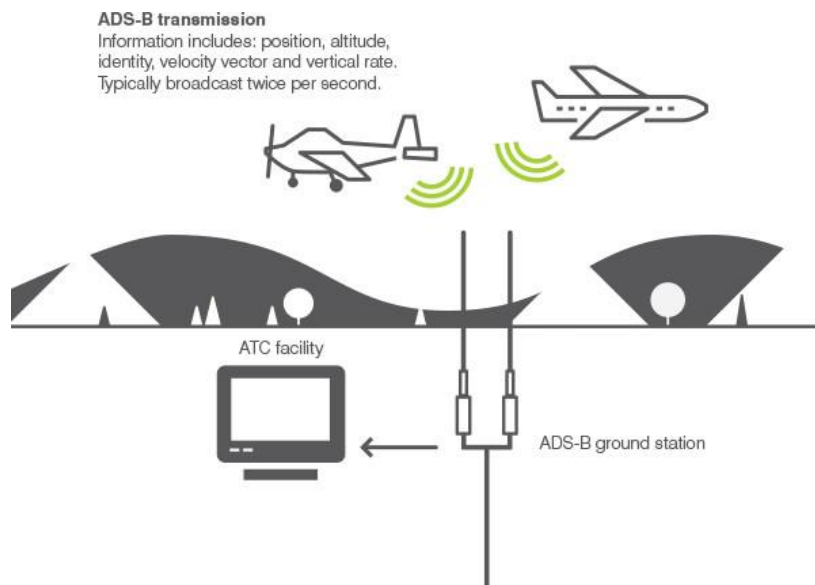
1.1.4 ADS-B IN

In addition to ADS-B OUT, aircraft equipped with an ADS-B IN receiver can receive these broadcasts and display cockpit display of traffic information (CDTI) to improve the pilot's situation awareness of other traffic.

Operators should be aware that pilots with ADS-B IN are receiving and using ADS-B OUT data for situational awareness using a cockpit display of traffic information (CDTI). CDTI should not to be used to replace separation procedures. Pilots may use the information provided by the ADS-B IN traffic display to aid with the visual acquisition of surrounding traffic. The ADS-B IN information supplements other information such as that which may be obtained through visual scanning or radio communications.

Note: *The ADS-B IN traffic picture displayed may be incomplete due to the presence of non-ADS-B equipped aircraft in the same airspace.*
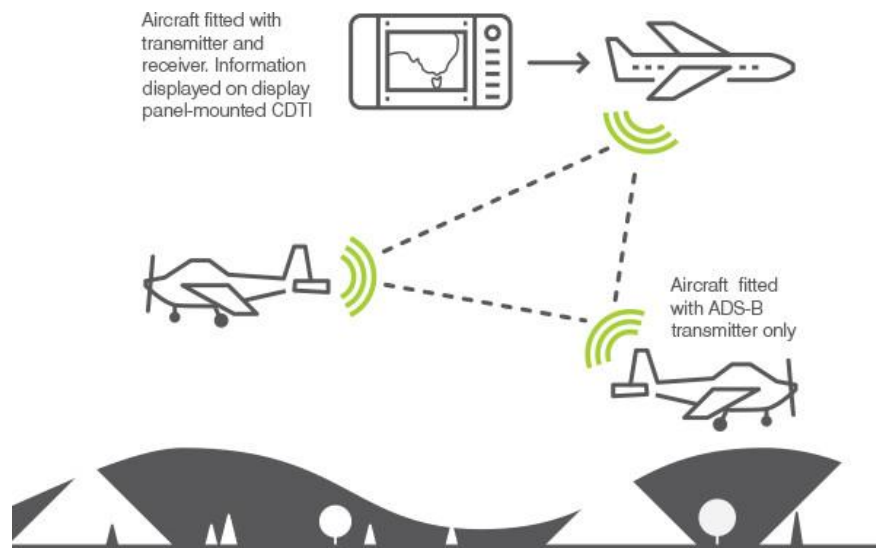
When using an ADS-B IN traffic display;

(a)   in the event of a TA or an RA, pilots shall comply with the ACAS procedures whether or not the tracks generated by ADS-B are shown on the same display as those generated by ACAS;

(b)   it must only be used as supplementary information to current procedures;

(c)   its use should not lead to a significant increase in radio communications; and

(d)   pilots must not undertake any manoeuvres relative to traffic based solely on the ADS-B IN traffic display that would lead to either a deviation from or a non-execution of an ATC clearance or instruction unless exercising their emergency authority. ADS-B IN is not a collision avoidance system.

Note: *Acceptable reaction to a traffic situation observed on an ADS-B IN traffic display may, for example, include manoeuvring into airspace visually cleared for traffic within the limitations of the current ATC clearance or remaining stationary during surface operations when a clearance to enter a runway has been provided.*

1.1.5   Benefits of ADS-B

Adoption of ADS-B for air traffic surveillance across airspace either inside or outside conventional radar coverage offers a range of benefits to commercial and general aviation pilots flying using IFR. These are:

▷   Position reports by voice no longer required for identified ADS-B aircraft.

▷   Ability to approve continuous rather than stepped climbs and descents to and from cruising level.

▷ Greater flexibility in allocating appropriate flight levels at the request of pilots. (That is, to climb to optimum flight level, as aircraft weight decreases with fuel burn.)

▷ Airspace which previously had no radar, and only procedural separation services, can now have an ATC surveillance service.

▷ Greater ability for ATC to grant clearances to fly requested routes or levels.

▷ Aircraft are easier to locate for search and rescue (SAR).

▷ Giving priority to ADS-B equipped aircraft becoming ANS policy (when doing so lowers the workload of ATC, thereby improving safety).

▷ Ability to replace radar.

1.2 ADS-C (AUTOMATIC DEPENDENT SURVEILLANCE — CONTRACT)

ADS-C uses various systems on board the aircraft to automatically provide aircraft position, altitude, speed, intent and meteorological data, which can be sent in a report to an ATS facility ground system for surveillance and route conformance monitoring.

The ADS-C utilises existing ADS-C aircraft equipage and air traffic control (ATC) capabilities to allow more flights to achieve their preferred vertical profiles, thereby increasing both capacity and efficiency. It may form part of a Future Air Navigation System (FANS)

In situations where standard separation minima would preclude an altitude change, the ADS-C climb and descent profile (CDP) enables a controller to issue an altitude change clearance that allows an aircraft to pass through the altitude of another aircraft.

2. USING ADS-B

2.1 Aircraft address

ADS-B systems typically broadcast two means of identifying the transmitting aircraft:

▷ the aircraft address (also known as the 24-bit code) allocated by the CAA upon initial registration, and

▷ the flight identification (FLTID)—the visual equivalent of a call sign—used to identify targets on a display and link them to their flight plans.

## 2.2 Flight identification (FLTID)

2.2.1 General

The FLTID is used in both ADS-B and Mode S secondary surveillance radar (SSR) technology. Up to seven characters long, it is usually set by the flight crew via a cockpit interface. It enables air traffic controllers to identify an aircraft on a display and to correlate a radar or ADS-B track with the flight plan data.

2.2.2   Setting the FLTID

Your call sign normally dictates the applicable option:

▷   the flight number using the ICAO three-letter designator for the aircraft operator if a flight number call sign is being used;

▷   the nationality and registration mark (without a hyphen) of the aircraft (e.g. T7ABC)

▷   Do not add any leading zeros, hyphens, dashes or spaces to the FLTID.
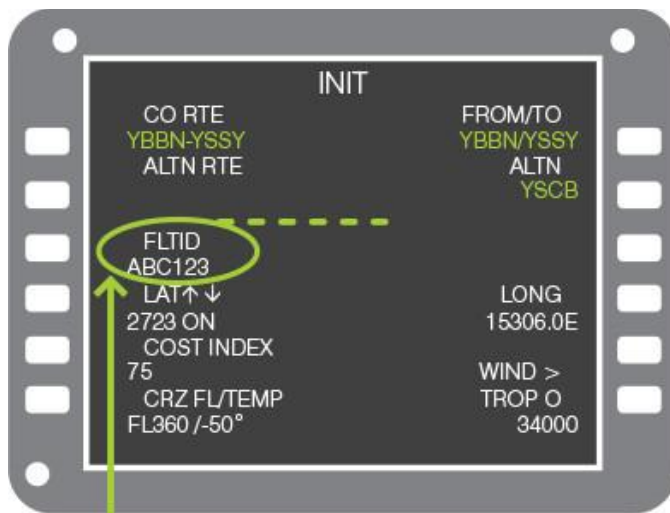
2.3   Flight Planning

The flight planning format requires pilots to indicate the surveillance equipment carried and operated on the aircraft.

Field 10b of the flight plan provides the following options for ADS-B equipped aircraft:

▷   E: Mode S transponder with Flight ID, pressure altitude and extended squitter (ADS-B) capability.

▷   L: Mode S transponder with Flight ID, pressure altitude, extended squitter (ADS-B), and enhanced surveillance capability.

As well as;

B1:   ADS-B OUT using 1090MHz (e.g. EB1 in field 10b), or

B2:   ADS-B IN and OUT using 1090MHz (e.g. EB2 in field 10b).

2.4   ADS-B Phraseology

Specific and generic radio phraseology is used for ADS-B and radar services. You should use specific phraseology when it is necessary to differentiate between radar and ADS-B. The ADS-B equivalent of 'squawk' is 'transmit' and ADS-B is pronounced 'ay-dee-ess-bee' over the radio.

2.5   Emergency Use

The method for notifying ATC of an emergency depends on the type of equipment carried and the surveillance coverage available. For example, does the aircraft have an ADS-B emergency function or an on/off switch only? Is it linked to the transponder, so that squawking 7600 also sends an ADS-B communications failure message?

Selection of an emergency transponder code, e.g. 7600, automatically generates an emergency indication in the ADS-B message. However, many transponders transmit only a generic ADS-B emergency indication. That means the specific type of emergency, such as communications failure, may not be conveyed to controllers in an ADS-B environment.

If an emergency indication is received from an aircraft in ADS-B airspace and the flight crew does not verbally communicate the nature of the emergency, the controller will initiate procedures for suspected unlawful interference. In an emergency, use all available means to signal your status, regardless of expected surveillance and communications coverage.

3.   APPLICATION FOR ADS-B OUT and/or ADS-C

3.1   Process

The application (refer Form SM 30) must address all of the sections on equipment, operational requirements, including documentation and training.

3.1.1   General Aviation Operator

General Aviation operators shall sign the "Declaration of Compliance" indicating all equipment, operational requirements, documentation and training meet the requirements for ADS-B Out or ADS-C approval. The required supporting documentation must be included.

3.1.2   Commercial Air Transport operator

Commercial Air Transport operators shall submit documentary evidence of the required information in the application form and provide Operations Manual references.

3.2   Airworthiness Requirements

The components of an ADS capable aircraft are usually installed at manufacture of a new generation aircraft and the manufacturer includes statements in the Aircraft Flight Manual, an AFM Supplement or STC.

Where an aircraft has been modified for ADS B/C, the operator must provide the CAA with all the supporting modification documentation for each aircraft registration.

Unless the approved MEL already addresses the required ADS equipment, an amendment to the MEL should be submitted to the CAA for approval.

It is up to the operator to determine that the maintenance organisation used is capable of providing maintenance support of navigation equipment and software.

That support must be provided by trained maintenance personnel capable of implementing digital communications related maintenance programmes. The support includes, but is not limited to;

(a)   addressing installation,

(b)   modification,

(c)   correction of reported system discrepancies,

(d)   use of test equipment,

(e)   procedures,

(f)   MEL relief, and

(g)   return to service authorisations.

3.3   Operational Requirements

To be eligible for an ADS approval from the CAA, the following operational issues need to be addressed by the operator:

(a)   Operating procedures (SOPs including Contingency Procedures);

(b)   FCOM (or AOM) & Quick Reference Handbook changes (if applicable);

(c)   Training programmes;

(d)   Provision of flight planning information for ADS.

4.   CERTIFICATION

The ADS approval will be issued on a Specific Approval Certificate for General Aviation operators,

a copy of which must be carried in the aircraft for all flights expected to be conducted in that airspace.

The ADS approval will be granted by inclusion in the Operations Specifications of the AOC holder.

5.   REPORTING ACTION

Unsafe conditions or performance related to data link operations such as a data link event, which potentially could affect continued safe operations, must be reported to the FIR controlling State and to the CAA within 24 hours.