CHANGE IN THE AIR

After a long period of consultation and development, which began in 2010 with an initial discussion paper, CASA is close to finalising important air traffic management (ATM) reforms.

Broadly, the proposed changes involve requiring operators of certain aircraft to fit avionics equipment to enable safe and efficient utilisation of new technologies supporting future ATM and satellite navigation. The proposed changes come at a time of increasing global harmonisation of ATM and satellite navigation standards. Historically, these changes have been developed in a co-operation with ASTRA* members as an acceptable compromise between the various industry sectors. The changes mainly affect IFR and do not affect Class G airspace below 10,000 feet.

(*ASTRA, the Australian Strategic Air Traffic Management Group, is an aviation industry body dedicated to developing an optimum air traffic management system for Australia. ASTRA members include the airlines, CASA, Airservices, the Aircraft Owners and Pilots Association, the Regional Aviation Association of Australia, the Australian Sport Aviation Confederation, the Australian & International Pilots' Association and others.)

In Australia, too, there are powerful drivers for change. Australia is at a watershed in its ATM, with many legacy ground-based navaids, such as non-directional beacons (NDB) and VHF omni-range (VOR) equipment, approaching the end of their useful life. The intention is to complete the transition to satellite navigation, which commenced in 1995, by early 2016, while retaining selected navaids to back up and mitigate any problems with GPS. Airservices is also providing new Mode S radars, multilateration at major city airports, wide area multilateration (WAM), and more ADS-B ground stations are being commissioned to provide improved services, coverage and increased safety.

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Another factor is increased air traffic: Western Australia's growing mining activity, for example can mean that aircraft are unable to enter or leave Perth controlled airspace when they request. The fact that en-route ATM outside radar is presently handled by procedural methods, with a 50nm procedural limitation, affects the amount of traffic in the airspace around Perth.

Consequently, for ongoing safety and efficiency, CASA is proposing a number of changes to avionics equipment. These changes apply especially to satellite-based IFR navigation; fitting of Mode S/ADS-B (automatic dependent surveillance – broadcast) transponders; and fitting of the updated version of the traffic collision avoidance system—TCAS II version 7.1.

Comments of the Notice of Proposed Rule Making 1105AS, circulated in January 2012, close on 13 March. No rule changes will be undertaken until feedback received by this date has been considered.

Broadly, the proposed changes are:

- Mandatory avionics equipment—GNSS navigation/ IFR aircraft
  - New* RPT and charter aircraft must be equipped for GNSS navigation under instrument flight rules (IFR) 6 February 2014 (*placed on the Australian register on/after 6 February 2014)
  - Existing* RPT and charter aircraft must be equipped for GNSS navigation under instrument flight rules (IFR) 4 February 2016 (*placed on the Australian register before 6 February 2014)
  - New* private and air work category aircraft undertaking IFR flight, must be equipped for GNSS navigation 6 February 2014 (*placed on the Australian register on/after 6 February 2014)
  - Existing* private and air work category aircraft undertaking IFR flight, must be equipped for GNSS navigation 4 February 2016 (*placed on the Australian register before 6 February 2014)
- Mandatory Mode S ADS-B transponders (with ADS-B out capability*) (*transponder must be ADS-B capable, but the aircraft does not necessarily need to have GPS to support ADS-B)
  - For aircraft operating in controlled airspace—A, B, C and E, and above 10,000ft in class G—mandatory for new transponder installations and new aircraft placed on the Australian register on/after 6 February 2014
  - All aircraft operating at Brisbane, Melbourne, Perth and Sydney airports must be Mode S transponder-equipped by 4 February 2016.
- Mandatory ADS-B out capability
  - New* aircraft flying IFR must be equipped to transmit ADS-B 6 February 2014 (*placed on the Australian register on/after 6 February 2014)
  - Existing* aircraft flying IFR must be equipped to transmit ADS-B 2 February 2017 (*placed on the Australian register before 6 February 2014)
  - Any aircraft flying IFR in classes A, C or E airspace in the area bounded by a 500 nautical mile arc north and east of Perth Airport must be equipped to transmit ADS-B by 6 February 2016
- Mandatory fitting of TCAS II v7.1 avionics equipment
  - Before turbine-powered aeroplanes used in public transport, with
    - maximum certified take-off weight over 5700kg, and
    - certified to carry more than 19 passengers, and
    - first placed on the Australian register on/after 1 January 2014 (ICAO-determined compliance date)
  - can fly, they must be fitted with a serviceable, approved TCAS II v7.1

Another ADS-B mandate is even closer—in fact it's happening next year

By 12 December 2013, operators of aircraft flying at and above 29,000ft (FL290) must have ADS-B equipment installed and operating correctly. CASA mandated this mandatory fitting of ADS-B in 2009.

'We are now seeing over 70 per cent of all international flights in our flight information region getting the ADS-B service,' said Airservices senior engineering specialist and ADS-B program manager, Greg Dunstone, in December last year.

'A small number of airlines and business jet operators appear not to have made the move to have ADS-B installed. They need to get a move on, because the effective date is fast approaching,' Dunstone added. CASA is not expecting to issue exemptions.

After 12 December, 2013, non-ADS-B equipped aircraft will have to operate below FL290, with the corresponding disadvantage of less operational flexibility and potential delays because of procedural separation standards applied outside radar airspace.

What is ADS-B?

Simply, automatic dependent surveillance - broadcast, or ADS-B, is aircraft automatically sending flight information to air traffic control and to each other.

ADS-B broadcasts information about an aircraft, including its:

- identification
- position
- altitude (barometric and/or geometric)
- speed
- direction

The system also broadcasts technical information, such as position integrity/accuracy.

This data is automatically sent about every half-second. The system takes its information from other aircraft systems: a barometric encoder for altitude, and global navigation satellite system (GNSS) equipment for speed position and direction data.

The initials ADS- B describe the main characteristics of the system:

Automatic—the system requires no human input. No radar is needed to interrogate it.

Dependent—the system relies on information from aircraft systems.

Surveillance—the system allows ATC, and individual aircraft with cockpit displays of traffic information (CDTI), to see a picture of air traffic in an area.

Broadcast—the system is a broadcast to all listeners, rather than directly to a known receiver.

Airservices Australia completed the installation and commissioning of its nationwide automatic dependent surveillance-broadcast network in December 2009, with Australia becoming the first in the world to provide nationwide ADS-B coverage.

ADS-B is available to suitably-equipped aircraft at all flight levels within coverage of ground stations at 29 sites throughout the country, providing radar-like coverage over continental Australia for the first time. ADS-B data is also received by wide area multilateration (WAM) systems in Tasmania and at Sydney. The accuracy of the information displayed on air traffic controllers' screens allows separation standards to be reduced from 30nm to 5nm.

Using ADS-B

ADS-B systems typically broadcast two means of identifying the transmitting aircraft. The first is a technical means called the aircraft address (also known as the 24-bit code) and the second is 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.

Level off! Level off!

TCAS stands for traffic collision avoidance system, which has evolved through several versions since first introduced in 1990.

TCAS II V7.1 is an enhancement that verifies pilot response to a resolution advisory (RA) and may generate a TCAS resolution reversal, and changes the verbal advisories from 'adjust vertical speed, adjust' to 'level off, level off'. This enhancement came in response to the Uberlingen mid-air collision of 2002. In that accident, 71 people were killed when a Boeing 757 and a Tupolev 154 collided over southern Germany. The Tupolev crew had followed conflicting directions from the controller instead of obeying TCAS alerts.

ICAO is mandating TCAS II V7.1 on/after 1 January 2014. All public transport, turbine-powered aircraft above 5700kg certified to carry more than 19 passengers, first placed on the Australian register on/after 1 January 2014, must have TCAS II V7.1 before they can fly.

Aircraft identification

The aircraft identification (sometimes called the flight identification) is the equivalent of the aircraft call sign and is used in both ADS-B and Mode S-SSR technology. It is up to seven characters long, and is usually set by the flight crew using 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.

Aircraft identification is critical information, so enter it carefully. Punching in the wrong characters could lead to ATC confusing your aircraft with another. It is important that the identification exactly matches the aircraft identification (ACID) entered in the flight notification. Intuitive correlation between an aircraft's identification and radio callsign enhances situational awareness and communication.

Airline aircraft should use the three-letter ICAO airline code used in flight plans, not the two-letter IATA codes. For aircraft using registration, the code should exactly match the flight plan. For Australian domestic flights the preceding 'VH' should not be included.

Aircraft address

Each aircraft has a unique aircraft address, which consists of a 24-bit code allocated by CASA. This code is usually entered into the unit by a LAME at installation. The code is on the aircraft registration letter sent to aircraft owners by CASA. If your aircraft is not registered by CASA, you can get a code from the aircraft registry.

S for safety

ADS-B broadcasts are made using Mode S, the same standard as used on Mode S transponders, which are replacing the Mode A/C transponders used in radar surveillance. ADS-B enables automatic safety alerting within the ATC system including short term conflict alert and cleared level adherence monitoring. This is already active across the whole continent for equipped aircraft.

Mode S has less signal garbling, less erroneous data, and allows aircraft call signs to be displayed on the ATC radar screen. Mode S transmits a unique 24-bit aircraft address to greatly reduce the probability of identification errors.