



Australian Government

Civil Aviation Safety Authority

Instrument number CASA 61/14

I, JOHN FRANCIS McCORMICK, Director of Aviation Safety, on behalf of CASA, make this instrument under subregulation 209 (1) of the *Civil Aviation Regulations 1988 (CAR 1988)* and subsection 33 (3) of the *Acts Interpretation Act 1901*.

[Signed John F. McCormick]

John F. McCormick
Director of Aviation Safety

15 May 2014

Direction — use of ADS-B in foreign aircraft engaged in private operations

1 Commencement

This instrument commences on the day after registration.

2 Revocation

CASA instrument 521/09 (as amended) is repealed.

3 Definitions

The definitions in Schedule 1 also apply for Schedule 1A and Schedule 2.

4 Direction

I direct that each operator, and each pilot in command, of a foreign aircraft engaged in private operations flying into or out of Australian territory, or operating in Australian territory (a *foreign aircraft*), must comply with the condition mentioned in section 5.

5 Condition

It is a condition for operations under CAR 1988 that a foreign aircraft must conform to the requirements in Schedule 1 and Schedule 1A.

Note 1 Schedule 1 contains directions relating to the carriage and use of automatic dependent surveillance – broadcast (ADS-B) equipment in Australian territory.

Note 2 Schedule 1A contains directions relating to the standards for Mode S transponder equipment in Australian territory.

Schedule 1 Directions relating to carriage and use of automatic dependent surveillance – broadcast equipment

1 In this Schedule:

ADS-B means automatic dependent surveillance – broadcast.

ADS-B test flight means a flight to prove ADS-B transmitting equipment that is newly installed on the aircraft undertaking the flight.

aircraft means a foreign aircraft.

aircraft address means a unique code of 24 binary bits assigned to an aircraft by or under the authority of an NAA for the purpose of air-to-ground communication, navigation and surveillance.

approved equipment configuration means an equipment configuration that:

- (a) meets the conditions for approval set out in Schedule 2; or
- (b) is approved in writing by CASA.

Note Equipment configurations approved by CASA are published in Appendix D of Advisory Circular 21-45.

ATC means air traffic control.

ATSO means the Australian Technical Standard Order of CASA.

EASA means the European Aviation Safety Agency.

EASA AMC 20-24 means EASA document AMC 20-24 titled *Certification Considerations for the Enhanced ATS in Non-Radar Areas using ADS-B Surveillance (ADS-B-NRA) Application via 1090 MHz Extended Squitter*, dated 2 May 2008.

EHS DAPs means enhanced surveillance downlink of aircraft parameters.

ETSO means European Technical Standard Order of the EASA.

FAA means the Federal Aviation Administration of the United States.

FDE means Fault Detection and Exclusion, a feature of a GNSS receiver that excludes faulty satellites from position computation.

FL 290 means flight level 290.

Note Flight level 290 is defined in subregulation 2 (1) of CAR 1988.

foreign aircraft means a foreign aircraft engaged in private operations in Australian territory.

GNSS means the Global Navigation Satellite System installed in an aircraft to continually compute the position of the aircraft by use of the GPS.

GPS means the Global Positioning System.

HPL means the Horizontal Protection Level of the GNSS position of an aircraft as an output of the GNSS receiver or system.

Mode A is a transponder function that transmits a 4-digit octal identification code for an aircraft when interrogated by an SSR, the code having been assigned to the aircraft by ATC for the relevant flight sector.

Mode A code is the 4-digit octal identification code transmitted by a Mode A transponder function.

Mode C is a transponder function that transmits a 4-digit octal code for an aircraft's pressure altitude when interrogated by an SSR.

Mode C code is the 4-digit octal identification code transmitted by a Mode C transponder function.

Mode S is a monopulse radar interrogation technique that improves the accuracy of the azimuth and range information of an aircraft, and uses a unique aircraft address to selectively call individual aircraft.

NAA has the same meaning as in regulation 1.004 of the *Civil Aviation Safety Regulations 1998*.

Note “**NAA**, for a country other than Australia, means:

- (a) the national airworthiness authority of the country; or
- (b) EASA, in relation to any function or task that EASA carries out on behalf of the country.”

NIC means Navigation Integrity Category as specified in paragraph 2.2.3.2.7.2.6 of RTCA/DO-260A.

NUCp means Navigation Uncertainty Category – Position as specified in paragraph 2.2.8.1.5 of RTCA/DO-260.

RTCA/DO-229D means document RTCA/DO-229D titled *Minimum Operational Performance Standards for Global Positioning System/Wide Area Augmentation System Airborne Equipment*, dated 13 December 2006, of the RTCA Inc. of Washington D.C., USA (**RTCA Inc.**).

RTCA/DO-260 means RTCA Inc. document RTCA/DO-260 titled *Minimum Operational Performance Standards for 1090 MHz Automatic Dependent Surveillance – Broadcast*, dated 13 September 2000.

RTCA/DO-260A means RTCA Inc. document RTCA/DO-260A titled *Minimum Operational Performance Standards for 1090 MHz Automatic Dependent Surveillance – Broadcast (ADS-B) and Traffic Information Services – Broadcast (TIS-B)*, dated 10 April 2003.

SA means Selective Availability, and is a function of the GPS that has the effect of degrading the accuracy of the computed GPS position of a GNSS-equipped aircraft.

SSR means a secondary surveillance radar system that is used by ATC to detect an aircraft equipped with a radar transponder.

TSO means Technical Standard Order of the FAA.

Note NAA is defined in regulation 1.4 of the *Civil Aviation Safety Regulations 1998*.

- 2 If an aircraft carries ADS-B transmitting equipment for operational use in Australian territory, the equipment must comply with an approved equipment configuration.
 - 3 If an aircraft carries serviceable ADS-B transmitting equipment for operational use in Australian territory, the equipment must transmit:
 - (a) a flight identification that corresponds exactly to the aircraft identification mentioned on the flight notification filed with, or relayed to, air traffic control (**ATC**) for the flight; or
 - (b) if no flight notification is filed or relayed for the flight — a flight identification that is the aircraft's nationality or common mark, and its registration mark, without any hyphen included, or such other mark as is authorised by the NAA; or
 - (c) another flight identification directed or approved by ATC.
 - 4 If an aircraft carries serviceable ADS-B transmitting equipment that complies with an approved equipment configuration, the equipment must be operated continuously during the flight in all airspace at all altitudes unless the pilot is directed or approved otherwise by ATC.
 - 5 If an aircraft carries ADS-B transmitting equipment which does not comply with an approved equipment configuration, the aircraft must not fly in Australian territory unless the equipment is:
 - (a) deactivated; or
 - (b) set to transmit only a value of zero for the NUCp or NIC.
- Note* It is considered equivalent to deactivation if NUCp or NIC is set to continually transmit only a value of zero.
- 6 However, the equipment need not be deactivated as mentioned in clause 5 if the aircraft is undertaking an ADS-B test flight in V.M.C. in airspace below FL 290.
 - 7 Subject to clause 8, on and after 12 December 2013, if an aircraft operates at or above FL 290, it must carry serviceable ADS-B transmitting equipment that complies with an approved equipment configuration.
 - 7A Subject to clause 8, on and after 2 February 2017, an aircraft that is operated under the I.F.R. must carry serviceable ADS-B equipment that complies with an approved equipment configuration.
 - 8 Clauses 7 and 7A do not apply to an aircraft if:
 - (a) the aircraft owner, operator or pilot has written authorisation from CASA for the operation of the aircraft without the ADS-B transmitting equipment; or

- (b) the equipment is unserviceable for a flight, and each of the following applies:
 - (i) the flight takes place within 3 days of the discovery of the unserviceability; and
 - (ii) at least 1 of the following applies for the flight:
 - (A) flight with unserviceable instruments or equipment has been approved by CASA, subject to such conditions as CASA specifies;
 - (B) the unserviceability is a permissible unserviceability set out in the minimum equipment list as approved by the NAA of the State of registration of the aircraft;
 - (C) CASA has approved the flight with the unserviceable equipment and any applicable conditions that CASA has specified in writing have been complied with; and
 - (iii) ATC clears the flight before it commences despite the unserviceability.

Schedule 1A Standards for Mode S transponder equipment

- 1 If the aircraft carries Mode S transponder equipment (the *equipment*), the equipment must meet the standards set out in this Schedule.
 - 2 The equipment must be of a type that is authorised by:
 - (a) the FAA, in accordance with TSO-C112 as in force on 5 February 1986, or a later version as in force from time to time; or
 - (b) EASA, in accordance with ETSO-C112a as in force on 24 October 2003, or a later version as in force from time to time; or
 - (c) CASA, in accordance with an instrument of approval of the type.
- Note 1* CASA Advisory Circular 21-46 provides guidelines on Mode S transponder equipment.
- Note 2* If Mode S transponder equipment incorporates ADS-B functionality, the standards set out in Schedule 1 for ADS-B transmitting equipment will also apply to the Mode S transponder equipment.
- 3 The aircraft address entered into the equipment must exactly correspond to the aircraft address assigned to the aircraft by the NAA of the State of registration of the aircraft.
 - 4 The equipment must transmit each of the following when interrogated on the manoeuvring area of an aerodrome or in flight:
 - (a) the aircraft address;
 - (b) the Mode A code;
 - (c) the Mode C code;
 - (d) subject to clause 6, the aircraft flight identification in accordance with clause 5.
 - 5 The aircraft flight identification must:
 - (a) if a flight notification is filed with ATC for the flight — correspond exactly with the aircraft identification mentioned on the flight notification; or
 - (b) if no flight notification is filed with ATC for the flight — be the aircraft's nationality and registration mark; or
 - (c) be another flight identification directed or approved for use by ATC.
 - 6 Mode S transponder transmission of the aircraft flight identification is optional for any aircraft that was first registered in its State of registration before 9 February 2012 (an *older aircraft*). However, if an older aircraft is equipped to transmit, and transmits, an aircraft flight identification then that aircraft flight identification, must be in accordance with clause 5.
 - 7 If the equipment transmits any Mode S EHS DAPs, the transmitted DAPs must comply with the standards set out in paragraph 3.1.2.10.5.2.3 and Table 3-10 of Volume IV, Surveillance and Collision Avoidance Systems, of Annex 10 of the Chicago Convention.

Note 1 Paragraph 3.1.2.10.5.2.3 includes 3.1.2.10.5.2.3.1, 3.1.2.10.5.2.3.2 and 3.1.2.10.5.2.3.3.

Note 2 Australian Mode S SSR are EHS DAPs-capable, and operational use of EHS DAPS is to be introduced in Australia. Implementation of Mode S EHS DAPs transmissions that are not in accordance with the ICAO standards may be misleading to ATC. Operators need to ensure that correct parameters are being transmitted.

8 If the equipment is carried in an aircraft first registered in its State of registration on or after 9 February 2012:

- (a) having a certificated maximum take-off weight above 5 700 kg; or
- (b) that is capable of normal operation at a maximum cruising true air speed above 250 knots;

the equipment's receiving and transmitting antennae must:

- (c) be located in the upper and lower fuselage; and
- (d) operate in diversity, as specified in paragraphs 3.1.2.10.4 to 3.1.2.10.4.5 (inclusive) of Volume IV, Surveillance and Collision Avoidance Systems, of Annex 10 of the Chicago Convention.

Note Paragraph 3.1.2.10.4.2.1 is recommendatory only.

Schedule 2

Part A

Approved equipment configuration

- 1 An equipment configuration is approved if it complies with the standards specified in Part B or Part C of this Schedule.

Part B

ADS-B transmitting equipment — standard for approval

- 2 ADS-B transmitting equipment must be of a type that:
 - (a) is authorised by:
 - (i) the FAA in accordance with TSO-C166 as in force on 20 September 2004, or a later version as in force from time to time; or
 - (ii) CASA, in writing, in accordance with:
 - (A) ATSO-C1004a as in force on 16 December 2009, or a later version as in force from time to time; or
 - (B) ATSO-C1005a as in force on 16 December 2009, or a later version as in force from time to time; or
 - (b) meets the following requirements:
 - (i) the type must be accepted by CASA as meeting the specifications in RTCA/DO-260 dated 13 September 2000, or a later version as in force from time to time;
 - (ii) the type must utilise HPL at all times HPL is available; or
 - (c) is otherwise authorised, in writing, by CASA for the purposes of subsection 9B of Civil Aviation Order 20.18 as being equivalent to one of the foregoing types.

GNSS position source equipment — standard for aircraft manufactured on or after 8 December 2016

- 3 For an aircraft manufactured on or after 8 December 2016, the geographical position transmitted by the ADS-B transmitting equipment must be determined by:
 - (a) a GNSS receiver of a type that is authorised by the FAA in accordance with TSO-C145a or TSO-C146a as in force on 19 September 2002, or a later version as in force from time to time; or

- (b) a GNSS receiver of a type that is authorised by the FAA in accordance with TSO-C196 as in force on 9 September 2009, or a later version as in force from time to time; or
- (c) a GNSS receiver or system which meets the following requirements:
 - (i) is certified by an NAA for use in flight under the I.F.R.;
 - (ii) has included in its specification and operation the following:
 - (A) FDE, computed in accordance with the definition at paragraph 1.7.3 of RTCA/DO-229D;
 - (B) the output function HPL, computed in accordance with the definition at paragraph 1.7.2 of RTCA/DO-229D;
 - (C) functionality that, for the purpose of HPL computation, accounts for the absence of the SA of the GPS in accordance with paragraph 1.8.1.1 of RTCA/DO-229D; or
- (d) another equivalent system authorised in writing by CASA.

Note The following GNSS receivers meet the requirements of clause 3, namely, those certified to TSO-C145a or TSO-C146a, or later versions, or those manufactured to comply with TSO-C196.

GNSS position source equipment — standard for aircraft manufactured before 8 December 2016

- 4 For an aircraft manufactured before 8 December 2016, the geographical position transmitted by the ADS-B transmitting equipment must be determined by:
 - (a) a GNSS receiver or system that complies with the requirements of clause 3, other than sub-subparagraph 3 (c) (ii) (C) which is optional; or
 - (b) an equivalent GNSS receiver or system that has been approved in writing by CASA.

Note The following GNSS receivers meet the requirements of clause 4, namely, those certified to TSO-C145a or TSO-C146a, or later versions, or those manufactured to comply with TSO-C196. Some later versions of GNSS receivers certified to TSO-C129 may also meet the requirements, i.e. those having FDE and HPL features incorporated.

Altitude source equipment — standard

- 5 The pressure altitude transmitted by the ADS-B transmitting equipment must be determined by:
 - (a) a barometric encoder of a type that is authorised by:
 - (i) the FAA in accordance with TSO-C88a as in force on 18 August 1983, or a later version as in force from time to time; or
 - (ii) EASA in accordance with ETSO-C88a as in force on 24 October 2003, or a later version as in force from time to time; or
 - (b) another equivalent system authorised in writing by CASA.

Aircraft address — standard

- 6 Unless otherwise approved in writing by CASA, the ADS-B transmitting equipment must:
 - (a) transmit the current aircraft address; and
 - (b) allow the pilot to activate and deactivate transmission during flight.

Note The requirement in paragraph 6 (b) is met if the ADS-B transmitting equipment has a cockpit control that enables the pilot to turn the ADS-B transmissions on and off.

Part C

Alternative approved equipment configuration — standard for aircraft manufactured on or after 8 December 2016

- 7 For an aircraft manufactured on or after 8 December 2016, an equipment configuration is approved if:

- (a) it has been certified by EASA as meeting the standards of EASA AMC 20-24; and
- (b) the aircraft flight manual attests to the certification; and
- (c) the GNSS receiver or system complies with the requirements of clause 3 in Part B.

Alternative approved equipment configuration — standard for aircraft manufactured before 8 December 2016

- 8 For an aircraft manufactured before 8 December 2016, an equipment configuration is approved if:
- (a) it has been certified by EASA as meeting the standards of EASA AMC 20-24; and
 - (b) the aircraft flight manual attests to the certification; and
 - (c) the GNSS receiver or system complies with the requirements of clause 4 in Part B.
-