Explanatory Statement

Civil Aviation Act 1988

Civil Aviation Order 82.1 Amendment Order (No. 2) 2009

Purpose
The purpose of *Civil Aviation Order 82.1 Amendment Order (No. 2) 2009* (the ***CAO 82.1 amendment***) is to ensure that certain amended requirements, in relation to the use of automatic dependent surveillance – broadcast (***ADS-B***) avionics, apply to operators of *foreign* aircraft in Australian territory engaged in charter operations or aerial work operations (the ***relevant foreign aircraft***).

Under *Civil Aviation Order 20.18 Amendment Order (No. 3) 2009* (the ***latest CAO 20.18 amendment***), the amended requirements mentioned above apply to *Australian* aircraft. The CAO 82.1 amendment, which commences at the same time as the latest CAO 20.18 amendment, operates by imposing on relevant *foreign* aircraft the same requirements for ADS-B as are imposed on Australian aircraft by the latest CAO 20.18 amendment.

By way of summary background, the latest CAO 20.18 amendment now being applied contains new standards for GNSS position source equipment. This aircraft avionics equipment provides the aircraft positional and velocity data that are transmitted by interconnected ADS-B equipment for use by air traffic control (***ATC***). Some new standards are necessary because, in current economic conditions, some airlines now intend to retain some airline fleet aircraft beyond the previous post-2013 transition timeframe and these aircraft would not otherwise have been completely covered by the relevant technical standards. In addition, there has been some delay in deliveries of new-technology aircraft, causing longer retention of aircraft. A recent technical standard issued in USA by RTCA Inc., and on which the FAA standards will be based, must also be taken into account.

Background
ADS-B avionics is an emerging aircraft surveillance system using ground stations to receive radio signals transmitted by ADS-B equipped aircraft. Using ADS-B avionics, an aircraft is able to broadcast its identity, position, velocity and many other flight parameters with a degree of accuracy, integrity and reliability that is better than secondary surveillance radar (***SSR***). However, the installation of ADS-B ground stations is much more economical than conventional radar stations. Hence, it provides the potential for a much greater geographical area – ultimately nationwide – to be covered by transmissions for surveillance by ATC, thereby enhancing the safety of air navigation.

Airservices Australia trial
Airservices Australia (***AA***) undertook a longstanding operational trial of ADS-B in airspace in the vicinity of Bundaberg, Queensland. The main objective of the trial was to confirm ADS-B performance and assess whether it was at least as good as SSR in accuracy, integrity, availability and reliability.

Both AA and CASA were satisfied that ADS-B avionics are at least as effective as SSR. As a result, AA commenced deployment of 32 ADS-B ground stations across Australia (the ADS-B Upper Airspace Project (***UAP***)) to provide for a continent-wide surveillance service at and above flight level (***FL***) 290, as well as significant coverage to lower levels particularly in the vicinity of those aerodromes where ground stations are installed.

For AA, UAP offered efficiency benefits in relation to airspace capacity and the ability to accommodate preferred routes and levels under Required Navigation Performance (***RNP***). However, CASA's interest was the safety of air navigation. CASA concluded that the scheme provided substantial safety benefits stemming from the much broader reach of radar-like surveillance of ADS-B equipped aircraft for air traffic management (***ATM***) purposes.

Civil Aviation Order 20.18 Amendment Order (No. 1) 2007 (the *first CAO 20.18 amendment*)
The first CAO 20.18 amendment inserted a new subsection 9B and Appendix XI into Civil Aviation Order (***CAO***) 20.18 to establish standards and directions for those aircraft deciding to carry ADS-B transmitting equipment. The equipment must comply with an equipment configuration approved by CASA or as set out in Appendix XI. These ADS-B surveillance services were, therefore, progressively available to any aircraft operator who *voluntarily* equipped their aircraft and trained their crews for ADS-B.

Civil Aviation Order 20.18 Amendment Order (No. 1) 2009 (the *earlier CAO 20.18 amendment*)
An earlier CAO 20.18 amendment, in March 2009, made fitment and operation of approved ADS-B avionics equipment mandatory on and from 12 December 2013 for all Australian aircraft operations at or above FL 290 (unless CASA has authorised otherwise). Approved equipment is that which meets the approved equipment configuration in Appendix XI.

However, if ADS-B were carried voluntarily for operational purposes (in any airspace at any altitude), it must be approved equipment that makes specific flight identification transmissions, and it must be operated continuously (unless authorised otherwise by ATC). Non-approved equipment must be deactivated (except in V.M.C. test flights below FL 290).

To ensure comprehensive coverage, the earlier CAO 20.18 amendment operated in conjunction with simultaneous amendments to the same effect made to *CAOs 82.1, 82.3* and *82.5*. These amendments were directed at foreign aircraft engaged in aerial work, charter and regular public transport (***RPT***) operations. In addition, a direction instrument was issued under regulation 209 of the *Civil Aviation Regulations 1988* (***CAR 1988***) to foreign aircraft engaged in private operations. In this way, the ADS-B requirements applied (according to their terms) to all Australian and foreign registered aircraft operating in Australia.

Latest CAO 20.18 amendment
In developing the latest CAO 20.18 amendment, CASA has taken account of recent information on availability of GNSS equipment modification kits, including representations from affected airlines, aircraft and avionics manufacturers, and IATA. This, and information presented at ICAO APAC forums (in Hanoi in May 2009 and Bangkok in July 2009), has highlighted issues concerning:

- the proposed retention by airlines of certain airline aircraft types that were planned to be retired before mid-2012
- the availability and timing of retrofit kits to equip current airline aircraft with certified GNSS and ADS-B equipment installations meeting existing Australian standards
- the very high cost and long lead times required for Boeing to supply modification kits, and the scheduling required for airlines to install retrofit kits during major maintenance to relevant aircraft, including Boeing 747-400, Airbus 330, Boeing 767 and Boeing 737-400 aircraft
- the need for a more specific statement of technical standards for GNSS equipment as it was clear that some airlines, and other key players may not have been fully aware of CASA's standards for GNSS. Although previously stated in CASA Advisory Circular 21-45, the intention is now to explicitly specify the GNSS standards within the regulatory material.

In light of consultations, the latest CAO 20.18 amendment prescribes differing standards for GNSS equipment (with Selective Availability Aware capability incorporated) depending on whether the relevant aircraft were manufactured before or after 28 June 2012. This represents a relaxation of the existing requirements in the CAOs which were not aircraft specific in this sense. However, this does not alter the date, 12 December 2013, on and after which an aircraft at or above FL 290 is required to carry and operate complying and serviceable ADS-B.

Consequential amendments for foreign operators
Like its predecessor, the latest CAO 20.18 amendment operates in conjunction with simultaneous amendments to the same effect made to *CAOs 82.1, 82.3* and *82.5*, and a new direction under regulation 209 of CAR 1988, thereby extending applicability of the new standards to foreign aircraft.

Therefore, the ADS-B requirements apply (according to their terms) to all Australian and foreign registered aircraft engaged in private, aerial work, charter or RPT operations in Australian airspace.

This instrument is, therefore, the component in this suite of instruments that applies the new standards to operators of foreign aircraft engaged in charter operations or aerial work operations in Australia.

Details of the CAO 82.1 amendment and legislative background
Under section 27 of the Act, CASA may issue Air Operators' Certificates (***AOCs***) with respect to aircraft, for the purpose of safety regulation.

Under sections 27AB, 27AC and 27AD of the Act, applicants must, in particular circumstances, provide CASA with certain manuals and other information, and undertake proving flights, tests and demonstrations.

Under section 27AE of the Act, CASA may require an applicant for a foreign aircraft AOC to provide additional information.

Under section 28 of the Act, CASA must issue the AOC if satisfied that the applicant can comply with the requirements of Australian civil aviation safety legislation.

Under paragraph 28BA (1) (b) of the Act, an AOC has effect subject to any conditions specified in the regulations or the CAOs.

Part 82 of the CAOs specifies conditions on AOCs. CAO 82.1 contains conditions on those AOCs that authorise charter operations or aerial work operations.

Subsection 5 of CAO 82.1 sets out obligations on operators who hold foreign aircraft AOCs for aerial work, or charter, operations in Australia – the relevant foreign operators. In particular, paragraph 5.8 provides that the operator of a foreign registered aircraft must ensure that it complies with the requirements (Directions) in Appendix 3.

Details of the CAO 82.1 amendment are set out in Attachment 1.

Legislative Instruments Act (the *LIA*)
Paragraph 28BA (1) (b) of the Act provides that an AOC has effect subject to any conditions "specified in the regulations or Civil Aviation Orders".

Subsection 98 (4A) of the Act provides that CASA may issue CAOs with respect to any matter "in relation to which regulations may be made for the purposes of section . . . 28BA".

Under subsection 98 (4B) of the Act, a CAO issued under subsection 98 (4A) is stated to be a legislative instrument and is, therefore, subject to tabling and disallowance in the Parliament under sections 38 and 42 of the LIA.

However, by providing that an AOC has effect subject to any conditions specified in the regulations or CAOs, paragraph 28BA (1) (b) of the Act is a separate head of power for the making of relevant CAOs. For section 5 of the LIA, such CAOs would be legislative instruments subject to tabling and disallowance in the Parliament under sections 38 and 42 of the LIA.

The CAO 82.1 amendment is made under both paragraph 28BA (1) (b) of the Act and subsection 98 (4A) of the Act and is a legislative instrument.

Consultation
The CAO 82.1 amendment represents a minor relaxation of the existing standards and timing for GNSS position source data in ADS-B transmissions. Being a relaxation of the existing requirement, consultation was limited to the directly affected parties, including AA, the International Air Transport Association (IATA), the International Civil Aviation Organization Asia and Pacific (ICAO APAC),

Qantas Airways Limited and the Boeing Commercial Airplane Company. As the proposed change affects air traffic surveillance for ATM, the proposal was closely co-ordinated with AA.

Regulation Impact Statement (*RIS*)

The amendments will not increase costs for, or impose any additional requirements on, aircraft operators. For many existing aircraft, there will be significant cost savings through some operators no longer having to modify GNSS installations. Therefore, OBPR does not require a RIS for the CAO 82.1 amendment because a preliminary assessment of the business compliance costs indicates that the CAO 82.1 amendment will have only a nil to low impact on business.

Commencement and making

The CAO 82.1 amendment takes effect on the day after it is registered. It has been made by the Director of Aviation Safety, on behalf of CASA, in accordance with subsection 84A (2) of the Act.

[Civil Aviation Order 82.1 Amendment Order (No. 2) 2009]

Attachment 1

Details of CAO 82.1 amendment

1 Name of instrument

Under this section, the instrument is named as the *Civil Aviation Order 82.1 Amendment Order (No. 2) 2009*.

2 Commencement

Under this section, the instrument commences on the day after it is registered.

3 Amendment of Civil Aviation Order 82.1

Under this section, Schedule 1 amends Civil Aviation Order 82.1.

Schedule 1 Amendment

[1] Appendix 3, clause 1, definitions

Amendment 1 inserts a series of new definitions into CAO 82.1.

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

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

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.

NAA has the same meaning as in regulation 1.4 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.

[2] Appendix 6, clause 3

This amendment, referring to "serviceable" ADS-B, makes an amendment consequential on the same amendment made to the "parent" CAO 20.18 by *CAO 20.18 Amendment Order (No. 2) 2009*, in June 2009, which was overlooked for CAO 82.1.

[3] Appendix 6, clause 4

This amendment, referring to "serviceable" ADS-B, makes an amendment consequential on the same amendment made to the "parent" CAO 20.18 by *CAO 20.18 Amendment Order (No. 2) 2009*, in June 2009, which was overlooked for CAO 82.1.

[4] Appendix 3, clause 5

Amendment 4 clarifies the requirements for an aircraft if it carries ADS-B transmitting equipment which does not comply with an approved equipment configuration. In such a case, the aircraft must not fly in Australian territory unless the equipment is deactivated or set to transmit only a value of zero for the NUCp or NIC. A Note explains that it is considered equivalent to deactivation if NUCp or NIC is set to continually transmit only a value of zero.

[5] Appendix 4

Amendment 5 substitutes a new Appendix 4 containing the standards for an approved equipment configuration as follows:

Part A

Approved equipment configuration

1 Under this clause, an equipment configuration is approved if it complies with the standards specified in Part B or Part C of Appendix 4.

Part B

ADS-B transmitting equipment — standard for approval

2 By stipulating alternative requirements, this clause extends the range of ADS-B equipment that would be considered approved.

Existing standards are largely provided for in paragraph (a), and alternative standards provided for in paragraph (b). Paragraph (c) preserves CASA's discretion. Thus, 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 Appendix 3 of this CAO as being equivalent to one of the foregoing types.

GNSS position source equipment — standard for aircraft manufactured on or after 28 June 2012

3 This clause adds alternative standards for conformity of GNSS equipment within an approved equipment configuration. Thus, for an aircraft manufactured on or after 28 June 2012, 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.

A Note explains that 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 28 June 2012

4 For the reasons mentioned earlier in this Explanatory Statement, this clause inserts standards for conformity of GNSS equipment for an aircraft manufactured before 28 June 2012. Thus, for an aircraft manufactured before 28 June 2012, 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.

A Note explains that 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 This clause is similar to the existing standard for altitude source equipment. Thus, 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 This clause is similar to the existing standard for aircraft addresses. Thus, 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.

A Note explains that 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 28 June 2012

7 The clause provides an alternative equipment configuration approval standard for an aircraft manufactured on or after 28 June 2012. Thus, an equipment configuration for such an aircraft 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 28 June 2012

8 The clause provides an alternative equipment configuration approval standard for an aircraft manufactured before 28 June 2012. Thus, an equipment configuration for such an aircraft 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.