



International Civil Aviation Organization

**AUTOMATIC DEPENDENT SURVEILLANCE –
BROADCAST SEMINAR AND TWELFTH MEETING
OF AUTOMATIC DEPENDENT SURVEILLANCE –
BROADCAST (ADS-B) STUDY AND
IMPLEMENTATION TASK FORCE (ADS-B SITF/12)**



Kolkata, India, 15-18 April 2013

**Agenda Item 6: Review States' activities on the implementation of ADS-B and
Multilateration**

**UPDATE ON AUSTRALIAN MANDATES FOR AIRCRAFT GNSS
AND ADS-B EQUIPMENT**

(Presented by Australia)

SUMMARY

This IP provides information on the rulemaking undertaken in 2012 by the Civil Aviation Safety Authority (CASA) to support the future Air Traffic Management (ATM) system. The rulemaking establishes the aircraft avionics mandates required for the airborne segment of the ATM system. The mandates are for satellite based navigation and for interoperation with the Mode S SSR and ADS-B based surveillance systems that are being implemented by the Australian ANSP, Airservices Australia.

1. Introduction

1.1 In September 2012, CASA issued Notice of Final Rule Making (NFRM) for the fitment of aircraft avionics to support the airborne segment of the future Air Traffic Management System (ATM) that is currently being rolled out by the ANSP, Airservices Australia (AsA).

1.2 The objective of the rulemaking is to improve the safety and efficiency of Air Traffic Management (ATM). The future ATM system in Australia is firmly based on GNSS for the implementation of ICAO Performance Based Navigation (PBN) standards and Mode S/ADS-B for air traffic surveillance.

1.3 This IP lists the aircraft mandates that have been made in Civil Aviation Order No. 20.18. The mandates apply to Australian registered aircraft undertaking flight under the Instrument Flight Rules (IFR) and the dates of effect are phased, commencing in February 2014 and ending in February 2017.

1.4 The mandates are additional to the first (longer-standing) mandate requiring aircraft ADS-B equipage for flight at/above FL290 in Australian territorial airspace, which takes effect on 12 December 2013. That mandate was promulgated in early 2009 and is applicable to both Australian and foreign aircraft.

2. Equipment mandates for GNSS Navigation under the IFR

2.1 Mandate 1 – Existing aircraft (defined as those placed on the Australian Aircraft Register before 6 February 2014) must be equipped with approved GNSS navigation equipment for flight under the Instrument Flight Rules (IFR) on/after 4 February 2016.

2.2 Mandate 2 – New aircraft (defined as those first placed on the Australian Aircraft Register on/after 6 February 2014), must be equipped for GNSS navigation under the IFR on/after 6 February 2014 in accordance with the standards meeting TSO-C145 or -C146 or -C196 or be approved by CASA as a Required Navigation Performance (RNP) capable aircraft.

3. Equipment mandates for fitment of Mode S transponders (with ADS-B OUT capability)

3.1 Mandate 3 – Aircraft first placed on the Australian Civil Aircraft Register on/after 6 February 2014 must be Mode S transponder equipped for flight in airspace classifications A, B, C or E or for flight above 10000FT in Class G airspace. (Exemptions apply in Class E and Class G only to aircraft that do not have an engine or do not have sufficient engine-driven electrical power generation capacity to power a Mode S transponder.)

3.2 Mandate 4 – Aircraft operating at Melbourne, Sydney, Brisbane and Perth Airports must be Mode S transponder equipped on and after 4 February 2016. This requirement is to support interoperability with the Advanced Surface Movement Guidance and Control System (A-SMGCS) that has been installed by Airservices Australia for surveillance of the manoeuvring area by ATC at these aerodromes. It also supports the WAM based Parallel Runway Monitoring (PRM) system at Sydney.

3.3 Mandate 5 - transponder retrofits: On and after 6 February 2014, for any new transponder retrofit installation undertaken in an aircraft, it is mandatory to install a Mode S transponder with ADS-B capability, not a Mode A/C transponder, although the associated GNSS unit to provide position source input is not necessarily required to be installed at that time of retrofit. This mandate has been issued in order to apply an end-date to the fitment of Mode A/C transponders.

3.4 Summary of the transponder rules:

Date of effect	Mandate	Status
9 February 2012	Mode S transponder standards <ul style="list-style-type: none"> • Aircraft fitting Mode S transponder must have FLTID capability. • All Mode S DAPs transmitted must be in accordance with ICAO Annex 10 Vol IV standards. • New aircraft registrations must have must have antenna diversity if >5700KG or cruise TAS >250 knots (ICAO standard) 	Regulation applicable to Australian aircraft (CAO 20.18 section 9C) Applicable in all airspace categories
6 February 2014	All aircraft registered in Australia on/after 6 Feb 201, or any aircraft replacing an existing transponder, must have Mode S with FLTID and ADS-B capability.	Regulation applicable to Australian aircraft (CAO 20.18 section 9E). Mode A/C transponder fitment not acceptable from 6 February 201.
4 February 2016	All aircraft operations at Melbourne, Brisbane, Sydney, Perth Airports must have Mode S transponder with FLTID	Regulation applicable to Australian aircraft for operation with A-SMGCS system – CAO 20.18 section 9E

4. Mandates for ADS-B OUT equipment

4.1 Mandate 6 – Existing aircraft (defined as those placed on the Australian Civil Aircraft Register before 6 February 2014) undertaking any flight under the IFR must be equipped to transmit ADS-B on and after 2 February 2017.

4.2 Mandate 7 – New aircraft (defined as those first placed on the Australian Civil Aircraft Register on/after 6 February 2014) undertaking any flight under the IFR must be equipped to transmit ADS-B on/after 6 February 2014.

4.3 Mandate 8 – Any aircraft undertaking flight under the IFR in airspace classes A, B, C or E within an area 500NM from the North of Perth Airport to 500NM East of Perth Airport must be equipped to transmit ADS-B on/after 4 February 2016. This requirement is to ease airspace congestion created by the Fly In/Fly Out of mining workers that has been generated by the industrial resources mining activity in Australia.

4.4 Summary of the existing GNSS and ADS-B OUT mandates:

Date of effect	Mandate	Status
6 June 2007	Non-complying ADS-B transmissions must be disabled before flight	Regulation applicable to Australian and foreign aircraft. Applicable in all airspace categories (CAOs 20.18, 82.1/3/5)
12 December 2013	Aircraft operation at/above FL290 in Australian territorial airspace must have ADS-B OUT equipment	
6 February 2014	All aircraft first registered in Australia on/after 6 Feb 2014 undertaking flight under the IFR must have GNSS and ADS-B OUT	Regulation applicable to Australian aircraft (CAO 20.18). Applicable in all airspace categories
4 February 2016	Aircraft undertaking flight under the IFR must have GNSS equipment All aircraft undertaking flight under the IFR must have ADS-B OUT within 500NM to the north through to the east of Perth Airport	
8 December 2016	ADS-B position source GNSS must have SA Aware feature for aircraft manufactured after 8 Dec 2016	Regulation applicable to Australian aircraft (CAO 20.18).
2 February 2017	All aircraft undertaking flight under the IFR must have ADS-B OUT equipment	Likely to be extended to foreign aircraft.

5 Aircraft applicability

5.1 Other than for the 12 December 2013 mandate for flight at/above FL290, the above mandates apply to Australian registered aircraft, not to foreign registered aircraft.

5.2 For foreign aircraft operating into Australia that are not already applicable to the CASA mandate for carriage of ADS-B for flight at/above FL290 from 12 December 2013, CASA proposes to extend the applicability of the February 2017 ADS-B mandate to foreign aircraft when operating in Australian territory. That would be implemented under further rulemaking to be undertaken in the next year.

5.3 The Australian mandates, including details of the required equipment technical certification standards are summarized in Tables 1 – 3 attached:

Table 1: Summary of Regulatory Mandates for GNSS NAV Requirement – aircraft undertaking flight under the IFR – minimum equipment required

Table 2: Mode S transponder equipment mandates by airspace classifications/aerodrome locations

Table 3: ADS-B equipment mandates by airspace classifications

6. Action by the Meeting

3.1 The meeting is invited to:

- a) note the information about the forthcoming Australian mandates for satellite based navigation and surveillance contained in this IP; and
- b) discuss any relevant matters as appropriate.

Table 1: Summary of Regulatory Mandates for GNSS NAV Requirement – aircraft undertaking flight under the IFR – minimum equipment required

CLASS OF OPERATION	Mandatory Minimum NAV System (TSO Certified Equipment)	COMPLIANCE DATE
Existing aircraft used in public transport services (those placed on the Australian Civil Aircraft Register before 06 February 2014)	2 x TSO-C145 or -C146 or -C196 (or later versions) GNSS OR RNP capable aircraft as approved by CASA OR 1 x TSO-C129, TSO-C145 or -C146 or -C196 GNSS + ADF or VOR (See Note 1)	04 February 2016
New aircraft used in public transport services (those first placed on the Australian Civil Aircraft Register on or after 06 February 2014), or new GNSS installations in aircraft placed on the Register before 06 February 2014	2 x TSO-C145 or -C146 or -C196 (or later versions) GNSS OR RNP capable aircraft as approved by CASA OR 1 x TSO-C145 or -C146 or -C196 GNSS + ADF or VOR (See Notes 1 and 2)	06 February 2014
Existing Private and Airwork aircraft (those placed on the Australian Civil Aircraft Register before 06 February 2014)	1 x TSO-C145 or -C146 or -C196 (or later versions) GNSS OR 1 x TSO-C129 GNSS + ADF or VOR (See Note 1) Note: TSO-C129 Navigator is unlikely to support ADS-B requirement/functionality.	04 February 2016
New Private and Airwork aircraft (those first placed on the Australian Civil Aircraft Register after 06 February 2014)	1 x TSO-C145 or -C146 or -C196 (or later versions) GNSS	06 February 2014
Night VFR aircraft	TSO-C129 or -C145 or -C196 GNSS or ADF or VOR	No required date; see Note 3
Use of GNSS for Oceanic and Remote Areas	GNSS may be used for enroute navigation in Oceanic and Remote Areas as approved by the State of Registry or the State of the Aircraft Operator.	Ongoing
<p>Note 1: When using TSO-C129 GNSS equipment the requirement for navigation equipment at alternate aerodromes must be met using ground based nav aids; (either ADF or VOR). Note 2: TSO-C145 or -C146 or -C196 (or later versions) GNSS are recommended as this standard of GNSS equipment may be required to meet later navigation and ADS-B approvals. Note 3: ADF or VOR may continue to be used where ground based navigation aids exist to support the flight requirements.</p>		

Table 2: Mode S Transponder equipment mandates by airspace classifications/aerodrome locations

Airspace Classification or Location	Transponder Equipage Requirement	Compliance Date
Classes A, C, E, and all airspace >A100	Mode A/C or Mode S transponder applicable to all aircraft capable of powering a transponder.	Existing requirement will remain in place. Existing exemptions for aircraft that cannot power a transponder will continue to apply.
All controlled airspace and > A100–new aircraft forward fit requirement from 06 February 2014	Mode S transponder (with ADS-B OUT capability*) required as forward fit; i.e. for new installations in existing aircraft and for all new aircraft placed on the Australian aircraft register after 06 February 2014 (if aircraft operation requires carriage of a transponder; i.e. aircraft operates in Classes A, C, E, or above A100 in Class G).	Mode S transponder (with ADS-B OUT capability*) in new aircraft or any new transponder installations in existing aircraft – from 06 February 2014. Exemptions will apply in only in Class E and G airspace for those aircraft that do not have an engine or if the engine has insufficient electrical power generation capacity to power a transponder. Exemptions will be subject to review/withdrawal.
Aircraft operation at Melbourne, Sydney, Brisbane, Perth Airports	All aircraft operating at these aerodromes to be equipped with Mode S TPDR (with ADS-B OUT capability*) for operation with Advanced – Surface Movement Guidance and Control System (A-SMGCS).	1 January 2016. No exemptions.

**Note: Requirement for a Mode S transponder (with ADS-B OUT capability) does not mean that ADS-B OUT transmission is also required. It means that with the later connection of compatible GNSS equipment, ADS-B OUT can be transmitted as well as Mode S responses*

Table 3: ADS-B equipment mandates by airspace classifications

Airspace Classification	ADS-B OUT Equipage Requirement	Compliance Date
Class A airspace > FL290	Existing regulatory requirement (Civil Aviation Order 20.18 section 9B)	12 December 2013
All airspace classes	Existing IFR capable aircraft placed on the Australian aircraft register before 06 February 2014. Forward fitment requirement - IFR capable aircraft first placed on the Australian aircraft register on/after 06 February 2014.	02 February 2017 Commencing on 06 February 2014
Aircraft operations in airspace Classes A, C, E extending 500nm to the North and East of Perth Airport	ADS-B OUT: All IFR capable aircraft to address the airspace congestion resulting from fly in – fly out air transport aircraft traffic to service the mining locations in Western Australia	04 February 2016

Note 1: The compliance dates listed in this table refer to the dates by which ADS-B avionics equipment with GNSS position source data will transmit ADS-B OUT, not the dates by which Mode S Extended Squitter transponder equipment will need to be installed under the mandates for Mode S equipage.