



Australian Government
Civil Aviation Safety Authority

ADS-B Regulation

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CIVIL AVIATION SAFETY AUTHORITY AUSTRALIA



1. Regulatory aspects of ADS-B

Standards Development

Ground Systems & Air Traffic Services

Avionics & Flight Operations

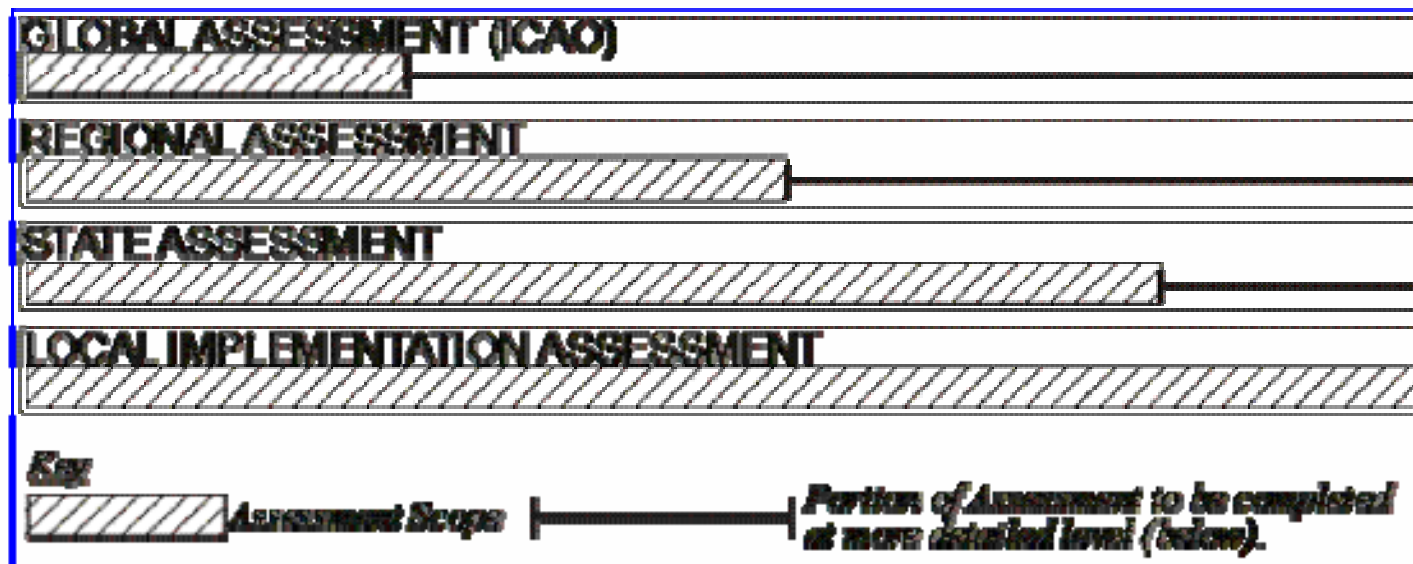
Safety Compliance

Safety Cases

Operational Approvals



2. SASP's Approach (Draft)



Annex 11 and PANS-ATM direct States to undertake safety assessments for significant changes in airspace organisation, ATS Procedures or the introduction of new equipment, system or facilities.



3. A Regulatory ADS-B Team

- Expertise in:
 - Airworthiness
 - Flying Operations
 - Air Traffic
 - Engineering

- Separate project teams where required.



4. Aeronautical telecommunication and radionavigation services

- ADS-B ground stations and supporting systems that meet operational needs (eg: RAIM forecast).
- Technical training
- Commissioning and Operational Approvals.



5. Air traffic services

- Separation and other ATS standards
- Training
- Safety Case
- Operational Approvals



“Radar-like” methodology

Comparison with a reference system

- Burnett Basin Trial safety case based on comparison with SSR in terms of accuracy, reliability, integrity and availability.
- Other factors include navigational performance of the aircraft population, communications, frequency and duration.



6. Carriage and Use of ADS-B Avionics

- What Equipment?
- How Used?
- What Procedures?
- When Required?
- What Training?



What Equipment?

- ADS-B Out (1090ES data link)
 - TSO-C166, ATSO-C1004, ATSO-C1005, or other suitable standards.
- Position Data Source
 - Baro + TSO-C145a/C146a or other suitable systems.
- Pilot Interface
 - On/Off Switch (Equipment performance & emergency considerations)
 - Flight ID Entry, Emergency Status, IDENT, Altitude Inhibit



How Used?

- Aircraft Address
 - 24bit code currently allocated to the aircraft.
- Flight ID
 - Coded equivalent of callsign.
- Flight Notification
 - RMK/ADSB
 - Hexadecimal code where required



What Procedures?

- Application
 - Coverage charts, services available and mixed equipage
- Phraseology
 - Radar equivalents and generic phrases.
- Emergency Status & 'Ident'
 - Circumstances, Coverage and Equipage.
- Use of CDTI
 - New skills required



When Required?

- Mandate scope and schedule

Application dependent – existing rules for other CNS equipment may provide useful model.

Considerations include: risk to be addressed, power requirements, equipment availability,



What Training?

- Syllabus
 - Principles of operation, relationship to radar & TCAS, dependence on GPS, coverage, two-tier services, flight planning & notification, Flight ID, emergencies, CDTI, equipment capabilities, phraseology.
- Pilot Guide
 - Also suitable for controllers and engineers.



7. Standards development review

- Is each rule/standard needed to address a known or likely safety risk?
- What is the extent of the safety risk being addressed and do the regulations/standards address that risk adequately?
- How have other authorities addressed the safety issues?
- Is the regulation/standard consistent with the ICAO SARPs and, if not, what is the justification for the difference?
- Is there anything missing from the regulatory package – are there safety risks not addressed in the package?



Safety Case for Australian Trial

- Based on Comparison to Radar (using ICAO Doc 9689-AN/953 with a single monopulse SSR)
- Prepared by Airservices and presented to CASA
 - ATC procedures & phraseology documented
 - Phased introduction (delayed due ATC training blockage – another project)
 - Data collection, operational exposure, situational awareness, separation
 - 5nm approval requires further operational data collection
- Integrity provided via NUC & Site monitor
 - NUC based on NPA RAIM ~ Radar performance
- Failure of avionics or GPS
 - Position symbol changes to "flight plan track"
 - As per today's environment
- Procedures & training manage other issues
 - RAIM prediction at Bundaberg passed to controllers

Project ADS B Operational Trial				
Hazard No. 41 Failure of ADS B system due to incorrect maintenance				
Generic Description Failure of the ADS B ground station and other system due to incorrect maintenance.				
Hazard Cause/Initiating Events				
Areas Affected Fraser sectors, planner and flow		Likelihood Remote	Initial Risk Remote	Residual Risk Remote
		Consequence Cat 3		Cat 3
		Risk D		D
Existing Mitigation				
Safety Requirement	Details	Responsibility	Status	Reference
Adequate Technical Training	Ensure adequate technical training is provided to all technical staff maintaining ADS B equipment.	Greg Dunston	Yet to be Met	
Validated Maintenance Procedures	Ensure validated maintenance procedures are available before accepting maintenance responsibility of ADS B	Greg Dunston	Yet to be Met	



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Australian Trial Procedures

AIP SUP H23/04

<http://www.airservicesaustralia.com/publications/aip.asp>

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AIP
SUPPLEMENT

AIRAC
H24/04

FILE : 2004/XXX

DATE : XX XXX 04

AUTOMATIC DEPENDENT SURVEILLANCE – BROADCAST (ADS-B) OPERATIONAL TRIAL BUNDABERG – QUEENSLAND

1. INTRODUCTION

1.1 Airservices Australia is conducting an operation trial of Automatic Dependent Surveillance Broadcast (ADS-B) technology in the airspace surrounding Bundaberg Queensland. The objective of the deployment is to demonstrate real operational benefits to operators in that region and to build a working knowledge of ADS-B in Australia.

1.2 The ADS-B systems will enable Airservices Australia to provide radar-like surveillance and related air traffic services to a limited number of aircraft that operate in the Wide Bay – Burnett region.

2. BACKGROUND

2.1 ADS-B is a function of specialised aircraft avionics that transmits parameters, such as position, altitude, aircraft identification and velocity. These parameters are broadcast at rapid intervals for utilisation by any appropriately equipped ground based user or aircraft that requires it.

2.2 When appropriately equipped trial aircraft are within radar range, radar information remains the principal means of surveillance. When these aircraft leave radar coverage, but are within range of an ADS-B ground station receiver, then position and altitude parameters received



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Australian Approval of Separation Trial

Instrument CASA 559/04

<http://casa.gov.au/rules/miscinst/2004/CASA559.pdf>



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INSTRUMENT NUMBER: CASA 559/04

CIVIL AVIATION ACT 1988

CIVIL AVIATION SAFETY REGULATIONS 1998

MANUAL OF STANDARDS (MOS) — PART 172

APPROVAL UNDER PARAGRAPH 1.1.5.5 OF THE MOS

TRIAL OF AUTOMATIC DEPENDENT SURVEILLANCE — BROADCAST
(ADS-B) TO PROVIDE FOR ATC SEPARATION

I, WILLIAM BRUCE BYRON, Director of Aviation Safety, on behalf of CASA, in order to develop appropriate standards for the provision of an air traffic service, under paragraph 1.1.5.5 of the Manual of Standards (MOS) — Part 172 issued by CASA under regulation 172.022 of the *Civil Aviation Safety Regulations 1998* (CASR 1998), approve the trial of new procedures and technologies described in Schedule 1, using the aircraft and operators specified in Schedule 2.

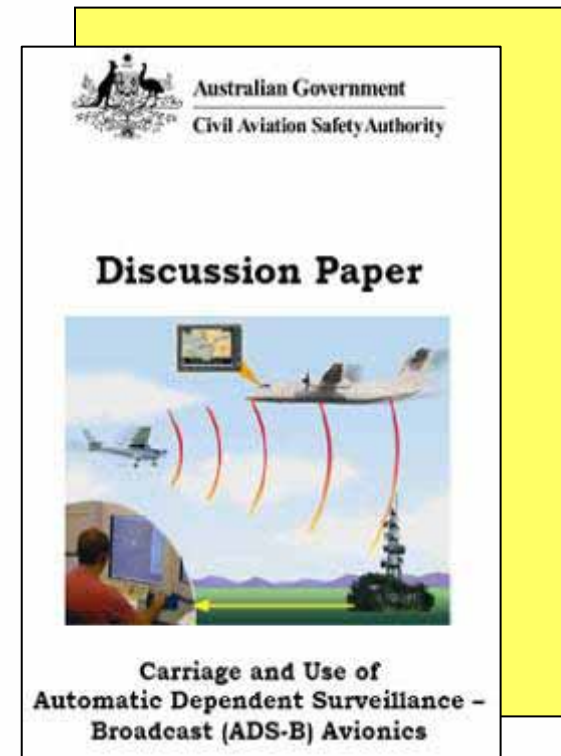
Interpretation

In this instrument:



Consultation Documents

- CASA Discussion Paper published December 2004.
- CASA Summary of Responses published September 2005.





ATSOs C1004 and C1005

Extended squitter ADS-B without a Mode S transponder

ATSO-C1004

Effective Date: 02/10/2003

Australian Technical Standard Order

**Subject: AIRBORNE MODE A/C TRANSPONDER EQUIPMENT WITH
EXTENDED SQUITTER AUTOMATIC DEPENDENT SURVEILLANCE –
BROADCAST (ADS-B) TRANSMISSION CAPABILITY**

**Subject: AIRBORNE
MODE A/C TRANSPONDER
EQUIPMENT WITH
EXTENDED SQUITTER
AUTOMATIC DEPENDENT
SURVEILLANCE –
BROADCAST (ADS-B)
TRANSMISSION
CAPABILITY**

1. PURPOSE. This Australian Technical Standard Order (ATSO) prescribes the minimum performance standards (MPS) which airborne Mode A/C Transponder equipment with Extended Squitter Automatic Dependent Surveillance – Broadcast (ADS-B) transmission capability must meet in order to obtain an ATSO authorization or letter of design approval and so be identified with the applicable ATSO marking.

Note: This ATSO provides a standard to build a Mode A/C transponder with the additional ability to provide ADS-B capability. It is not intended to replace existing Mode A/C or Mode S transponder equipment or standards.

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Note: This ATSO provides a standard to build a Mode A/C transponder with the additional ability to provide ADS-B capability. It is not intended to replace existing Mode A/C or Mode S transponder equipment or standards.

2. APPLICABILITY. This ATSO is effective for new applications submitted after the effective date of this ATSO.



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Further information available from
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