Making the Most of ADS-B

A General Aviation Pilot's Experience with ADS-B in Australia

New Southern Sky Conference 2018

Andrew Andersen
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Objectives

- Share a GA owner/pilot's experience with ADS-B
- Discuss the benefits of surveillance-based air traffic services for general aviation
- Highlight some observations.

Introduction

- Instrument-rated Private Pilot
  a few decades of flying since 1979
  a few thousand hours
- Aeroplane owner since 1989
  on the second one now, a Cessna 182S
- Active GA advocate
  AOPA Australia Committee 2009-13
  President AOPA Australia 2012-13
  Vice-President IAOPA Pacific Region 2012-13
- ASTRA participant since 2009
  Surveillance Technologies Working Group
  PBN Working Group
  Safety efficiency & Technology Working Group
- Some-time aviation writer
- *Information Technology Engineer*

How Does ADS-B Benefit GA?

1. Better coverage than radar
   – *more flights, more of the time, VFR or IFR*
2. Reduction in IFR (and some VFR) position reporting
   – *both inside and outside controlled airspace*
   – *less radio congestion*
3. Less dependence on procedural separation
   – greater capacity
   – *fewer delays*
4. More efficient routing
   - time and fuel savings
5. Reduced cost of infrastructure and services
6. Emergency capability
   – *unambiguous identification and position*
7. Pathway to future service capability
   – *airspace, routes, ADS-B IN*

What's Needed for GA to Utilise ADS-B?

Key Questions:

1. Is the ground infrastructure capable of detecting typical general aviation flights at lower levels?

2. Is equipment available to meet performance requirements at affordable cost?

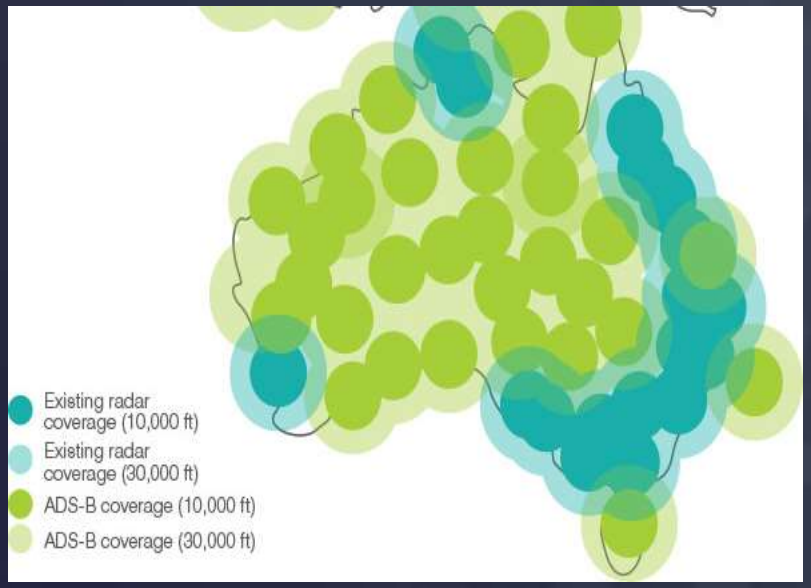
3. Are there ATC services that GA aircraft can use?

4. Are further benefits possible in future from technology extension? (for example, ADS-B IN)

ADS-B Coverage in Australia: Much Better than Radar

ADS-B ground stations have lower cost, require less power and reduced environmental impacts compared with radar.

This allows the ground stations to be installed in places where radar was impossible.



Radar versus ADS-B Coverage in Australia

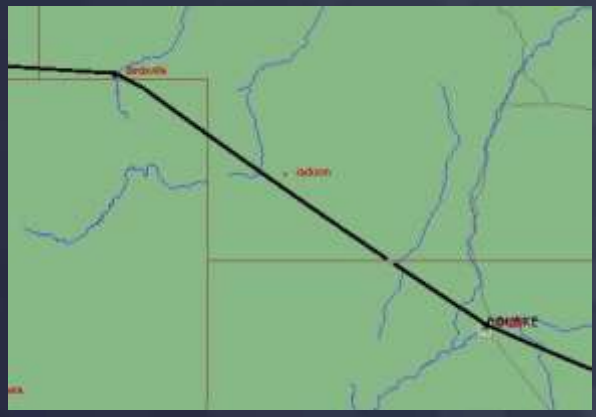
(*source: Civil Aviation Safety Authority, Australia*)

ADS-B Coverage in Australia at Altitudes Used by GA (*source: Airservices Australia*)

My Experience of Extended Surveillance Coverage

ATC Display

NW Coast WA
2500-3500 feet



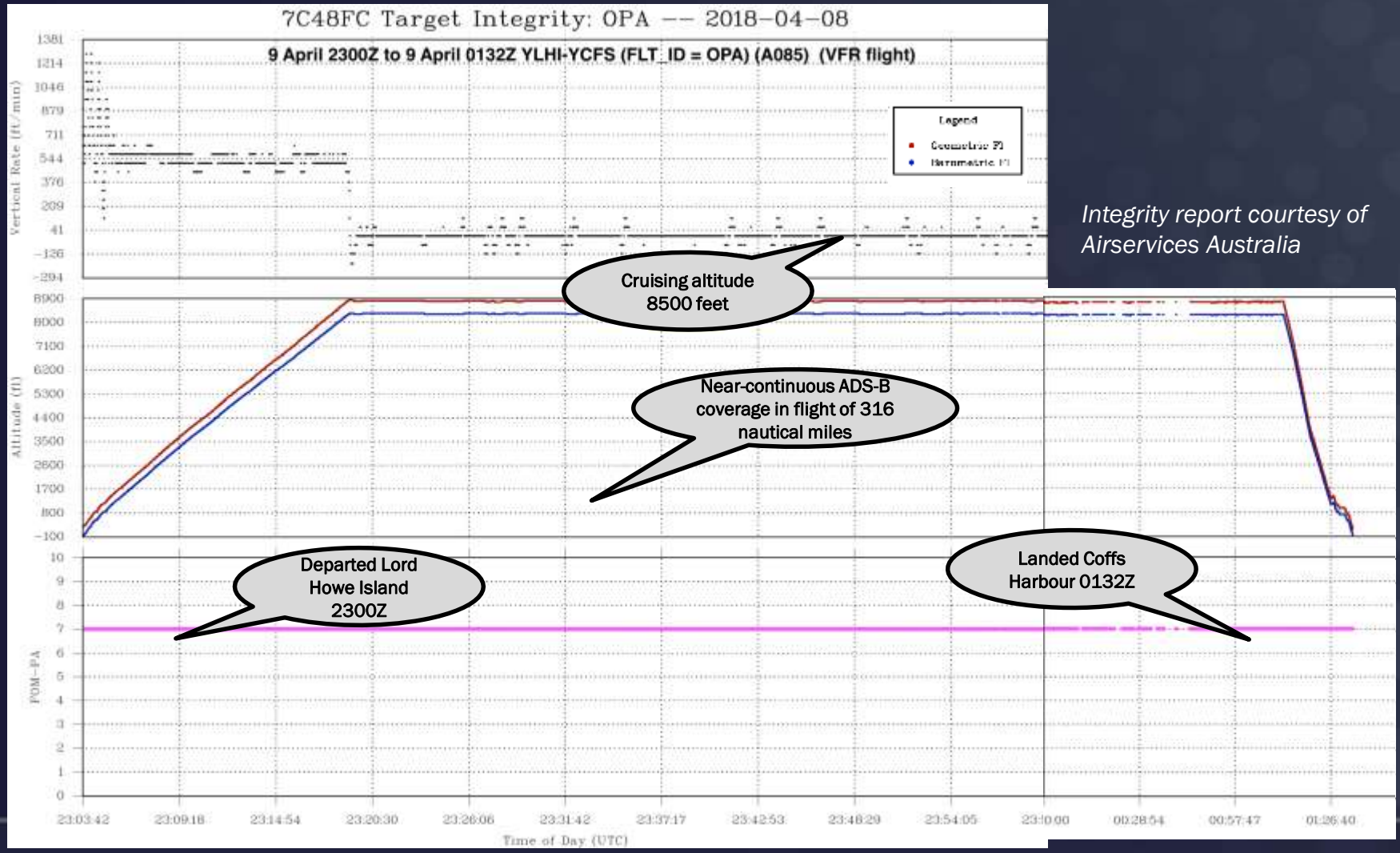
Ayers Rock
Circuit & Landing

Broome
Orbit & Landing

"Corner Country"
NW NSW, NE SA, SW Qld
9000 feet

All images courtesy of Airservices Australia

ADS-B identified, continuously, from Lord Howe Island to Coffs Harbour



Integrity report courtesy of Airservices Australia

Communicating the Value of ADS-B

ASTRA IP17-0*

The Australian Strategic Air Traffic Management Group
17th Surveillance Technologies Working Group Meeting
Canberra, 21 August 2014

Low-Level ADS-B in Practice

Prepared by Andrew Andersen

SUMMARY

The availability of ADS-B at lower levels in many parts of Australia provides general aviation with new opportunities for improvements in safety and efficiency. The benefits of low-level services are generally not well understood. More effective, appropriate informational and educational materials are encouraged.

1. INTRODUCTION

1.1 The fitment of ADS-B OUT avionics in all IFR aircraft that operate in Australia will become mandatory in 2016-17. Consequently, an increasing number of aircraft that fly exclusively at low levels[1] are now being equipped.

1.2 The current network of ADS-B ground stations provide surveillance capability to lower levels in many areas, enroute and terminal which, before their installation, were not visible to ATC surveillance services.

1.3 Project ACME will provide even greater surveillance coverage with an additional thirteen ground stations being installed in enroute areas.

1.4 Many of these areas are less populous and remote, although the volume of overflying or terminal air traffic may be proportionately much greater.

2. CURRENT LOW-LEVEL COVERAGE

2.1 Figures 1 and 2 depict current ADS-B coverage at 5,000 and 10,000 feet respectively.

2.2 It can be seen that many areas of ADS-B coverage are remote and that pilot intuition is unlikely to be effective in predicting coverage availability.

Photo Rob Andersen

Not just for jets at flight levels, ADS-B works for GA too. Andrew Andersen reports.

History, Controversy and Confusion

DIY Traffic Awareness

ADS-B Avionics for General Aviation

- Two basic types:
  - Self-contained, with its own GPS to provide position and other data
  - Integrated with an aircraft's separate TSO C145 or 146 navigation system
- For most owners, benefits must be commensurate with costs:
  - ADS-B benefits for VFR flight can be achieved without IFR PBN (Performance Based Navigation) equipment
  - Installed cost increases markedly with extent of new equipment and complexity
- Further discussion in this afternoon's workshop.

Images are the property of their respective owners

ADS-B for General Aviation: Air Traffic Services

- Operational benefits for both IFR and VFR - not just for jets
- Real experience: six continental crossings, one across the Tasman Sea, numerous 1.5-2.5 hr flights in NSW, Victoria and Queensland: (~600 flight hours)
  - Visible to ATC Birdsville-Bankstown, Bankstown-Ballina, Coffs Harbour-Lord Howe Island and many more, at typical GA altitudes
  - *VFR Flight Following* into Birdsville, Ayers Rock, WA coast, and more during RPT operations
  - IFR ADS-B services at/around Bourke, Broken Hill, Broome, Ayers Rock, Alice Springs, Longreach, and many others
  - Sometimes, visible to ATC even outside VHF radio coverage!
  - Streamlined IFR departures; abbreviated reports, better ATC service coordination
  - Faster and more accurate SAR response if something went wrong.

ADS-B for General Aviation: Air Traffic Services

- No position reports when identified: lowers pilot workload, no radio congestion
- Continuous flight information aids ATC coordination on longer flights
- Pilots surprised by value of traffic information in remote locations
  - For some, learning how to use it might be a new skill…
- Sometimes, the biggest problem is knowing where coverage exists.

… and then, there are those days when ATC-identification is even more welcome than usual

No one (with any sense) intentionally flies small aircraft close to hazardous weather, but when things go off-plan, ATC can provide:

- Traffic information, or clearances for diversions – accurately and quickly
- Navigation assistance
- Information in context – for example, METARs for potential alternates
- If all else fails, timely and accurate information in emergencies.

ADS-B IN for General Aviation

- Potential to mitigate inherent problems of:
  - High cost and limited range of “active” traffic systems (TAS)
  - “Passive” portable transponder detection systems (unsuited to sparse radar environments such as NZ and Australia)
  - Unalerted see and avoid human limitations
- Supports long-term direction for more strategic and less tactical ATC services
- Integrated with most popular tablet EFB apps
- Useful ground tool for businesses, flying clubs and families
- Simple 1090 receivers available, including some low cost
- Compatibility with USA TSO C199 TABS and UK LPATS for sport and recreational aircraft (including gliders).

Seek Opportunities to Maximise Benefits:

- Ground infrastructure capable of detecting GA flights at lower levels
- More affordable equipment than was available ten years ago
- ATC services that GA aircraft can use
- Future technology extension (particularly ADS-B IN)

1. Better coverage than radar
2. Reduction in IFR (and some VFR) position reporting
3. Less dependence on procedural separation
4. More efficient routing
5. Reduced cost of infrastructure and services
6. Emergency capability
7. Pathway to future service capability

ADS-B for GA: Some Observations

- GA should actively seek to share in the benefits of ADS-B to maximise safety and efficiency and minimise system costs
- Cost and lack of perception of benefits act as disincentives, but both IFR and VFR aircraft can gain worthwhile benefits
- Low-level coverage is key and pilots should be aware of extent of ADS-B coverage
- Once extended ADS-B coverage is available, use of surveillance monitoring services should be encouraged, especially on longer flights, or over less favourable terrain.