

Trans Continental Traffic Information and Flight Following

Photo Rob Andersen

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

A lot has been said and written about ADS-B in recent years. Much of the discussion is directed towards achieving a compliant installation at the lowest cost, and that's certainly understandable.

Way too often though, the discussion focuses on regulatory compliance, instead of safety and efficiency. One aspect that has received very little attention is how ADS-B can be used, beneficially, in typical GA operations.

History, Controversy and Confusion

The public debate about compulsory fitment of ADS-B in GA aircraft began just over seven years ago. At that time, the subject focused on making GA aircraft visible to airline aircraft, especially in regional areas. There were all sorts of analogies back then, but one that still makes me smile is that it would be just like a red tail-light; once installed, everyone else would be able to know the 'little plane' was there and remain separated accordingly.

That statement may certainly reflect

its future for many recreational aircraft, and some commercial aerial work, but it overlooks the fact that many GA aircraft are used for point-to-point flying, and a significant proportion of them do so under the IFR.

Then there are the pronouncements, by various luminaries, that GA will never gain any benefit from installing ADS-B. That's just not so, but there are some owners of recently-equipped aircraft wondering how to take advantage of their ADS-B installation at lower altitudes.

Since ADS-B OUT was installed in my Cessna 182, I've made a few crossings of the continent and seen, first-hand what works and what doesn't.

DIY Traffic Awareness

Before we launch into ATC services based on ADS-B OUT, it's worth remembering that many VFR operations don't need ATC at all.

Aircraft equipped with ADS-B IN can see aircraft equipped with ADS-B OUT, without any reliance on ground

infrastructure. ADS-B IN can be used in any aircraft (whether it has ADS-B OUT or not) for traffic awareness purposes. All aircraft that operate at and above flight level 290 are already equipped with ADS-B OUT; so if your regional airport is served by such aircraft (including Boeing 737, Embraer 190 and Airbus A320), you can become aware of their presence with an ADS-B IN receiver.

As well, a significant and increasing number of regional airliners (including many Saab 340) that operate below flight level 290 are already ADS-B OUT equipped.

Many traffic conflicts occur because one aircraft was simply oblivious to the presence of the other. An ADS-B IN receiver can eliminate part of the risk, at least in relation to aircraft equipped with ADS-B OUT, which will be all IFR aircraft in Australia by 2017.

In time, the ability to utilise ADS-B IN receivers in a range of forms is expected to bring the greatest benefits to GA from the ADS-B program.

ATC and ADS-B for GA

Whether ATC services derived from ADS-B are useful to GA depends on three things:

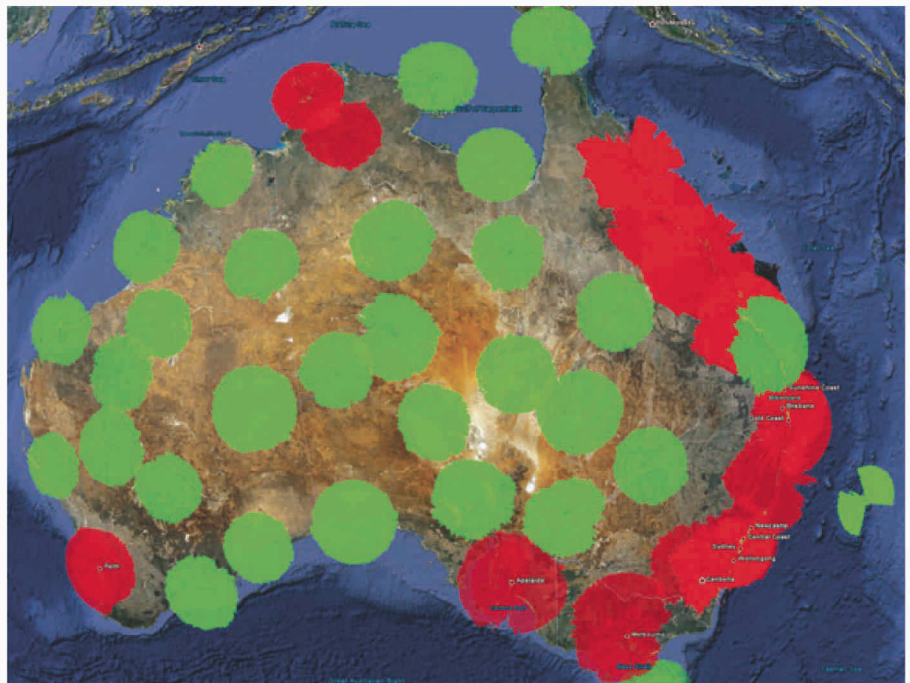
1. Whether the GA aircraft is equipped with ADS-B OUT, so that ATC can see it.
2. Ground station coverage, so that information sent by ADS-B OUT equipped aircraft can be received in as much of the country as possible.
3. Appropriate ATC surveillance services, such as Directed Traffic Information for IFR, and Flight Following for VFR.

The first one is a no-brainer. If ATC can't see your aircraft, it won't be possible for them to provide you with a surveillance service.

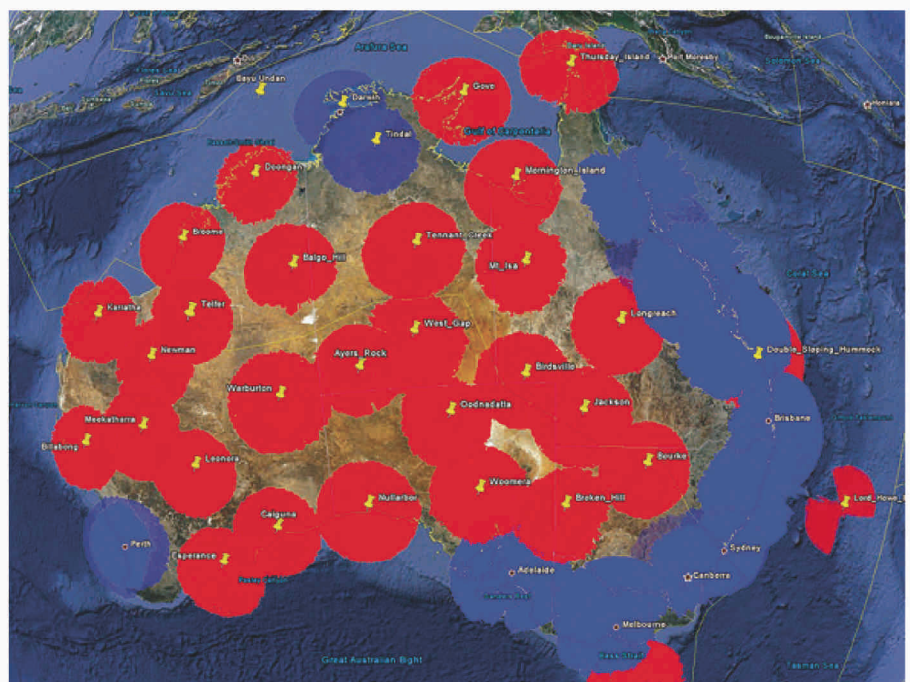
What's not so easy to figure out is the extent of Australia's ADS-B coverage, and the services themselves, however.

Low-Level ADS-B Coverage in Australia

In common with VHF radio and radar, ADS-B signals need a line-of-sight between the transmitting aircraft and the ground receiver. The higher you fly, the longer the range of your ADS-B transponder, which above FL 290 reach



Current ADS-B Coverage (Green) at 5,000 Feet – (Radar in Red)



Current ADS-B Coverage (Red) at 10,000 Feet – (Radar in Blue)

180-200 nautical miles. But how well does it work at the altitudes that we typically fly in GA?

Airservices Australia's website has some useful maps showing where ADS-B can be received at 5,000 and 10,000 feet. It seems that few pilots are aware

of them and as a result don't know where ATC services derived from ADS-B are available.

For IFR flight, that's not really a big problem, and as long as the pilot has properly notified ADS-B capability on the flight notification, simplified departure

calls can be made when pilots know they are in ADS-B coverage.

For VFR flight, however, flight following is provided only when pilots request it, which you probably won't do unless you have some confidence that the controller can see you.

In the course of a recent return trip from Sydney to Broome, it became clear to me that better understanding where ADS-B is available would be a big help.

The ADS-B engineering team at Airservices gave me access to the data from this trip, so I could do some analysis of my own, which I plotted on a map, with colours to represent the bands of altitudes flown.

The routes flown, in order, were: Bankstown-Bourke (IFR); Bourke-Birdsville-Tennant Creek (VFR); Tennant Creek-Tindal (IFR); Tindal-Kununurra-Broome-Karratha-Coral Bay (VFR); Coral Bay-Newman (IFR); Newman-Ayers Rock-Birdsville-Innaminka-Bourke (VFR); and Bourke-Bankstown (IFR).

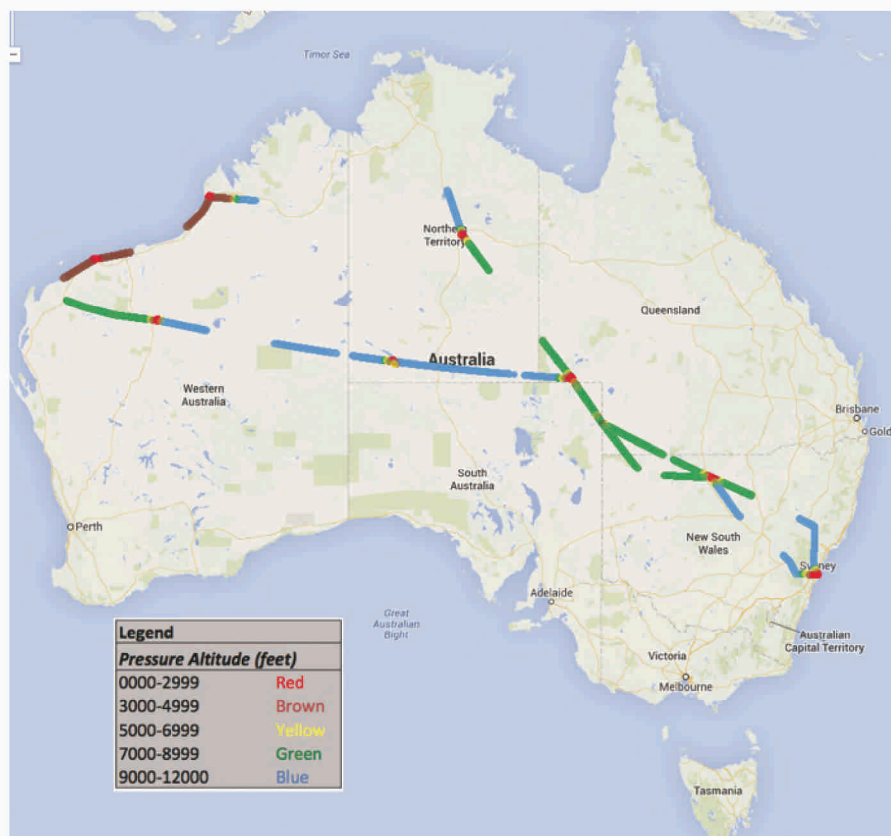
What really stands out from this analysis is the wide extent of surveillance coverage, in areas that previously had none, at the altitudes that most of us fly. As I don't like to create work for ATC I only request flight following where it's likely to be of some use; but it can be seen from the graphic that I could have had that service for almost all the trip within VHF radio coverage.

More, Please

In future, ADS-B coverage will continue to improve. Approval has been given for the next thirteen ADS-B ground stations, which will be installed in 2015-2016 at Mt William and Mt Tassie in Victoria; North Block in South Australia; Roma and Kynuna in Queensland; Tindal/Katherine in the Northern Territory; Bingari in NSW; and Learmonth, Halls Creek, Paraburdoo, Kalamunda, 23 Mile Ridge and Mt Singleton in Western Australia.

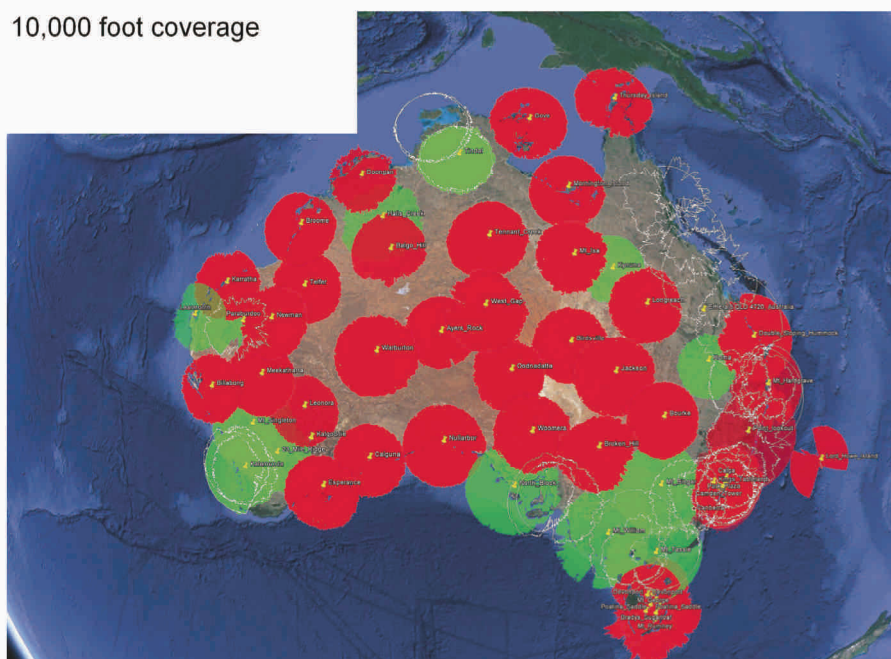
When that project is complete, ADS-B coverage at 5,000 feet will extend even further, as shown below.

The Airservices' ADS-B engineering team is looking beyond this project, too. Expect to see more ADS-B sites in some of our busier regional areas.



Analysis of ADS-B Reception from a Series of GA Flights at Low-Levels

10,000 foot coverage



Planned ADS-B Coverage at 10,000 Feet – (Existing in Red, New Stations in Green and Radar as Grey Lines)



Behind the Scenes...

Besides its role in facilitating ATC services direct to our cockpits, the new technology is making our regional towers safer, too. ADS-B can fill gaps during radar outages, or when aircraft descend below radar coverage. For aircraft bound to major airports, information obtained early in the flight can aid flow management and reduce delays, which is good for everyone. Some critical flight situations, such as Bass Strait crossings, are now safer, and SAR and terrain alerting more effective, for ADS-B equipped aircraft in coverage areas.

Getting the Benefits of ADS-B Services

So, if ADS-B has been installed in the aircraft you fly, how can you make the most of it?

1. Make sure you correctly notify ADS-B capability on every flight plan. It doesn't matter whether your flight will be IFR or VFR. The code in item 10 of your flight notifications indicates your ADS-B OUT capability. In most cases, this will be EB1: 'E' to indicate a Mode S transponder with aircraft identification (Flight ID), pressure altitude, and ADS-B capability; and 'B1' to indicate ADS-B OUT on 1090MHz. (Save time by setting the options correctly for your aircraft in your favourite EFB or computer flight planning software.)

2. Check out Airservices Australia's website for ADS-B availability in the areas in which you'll be flying.
3. If you're IFR, and anticipate being immediately identified, make your departure report accordingly, for example: "Brisbane Centre, ABC, 1 mile east of Bourke climbing 9,000 passing 4,700 estimating Coonamble at 02."
4. If you're flying VFR in an area of significant traffic, within ADS-B and VHF radio coverage, submit a flight notification and request flight following, for example "Melbourne Centre, ABC, request flight following". Be ready to give your position, altitude and intentions when ATC call you back.

Like anything else, traffic information is useless unless you think about what it means. Construct a mental picture of the situation, with the airport in the centre. Think about the speed of the other traffic in miles per minute and time estimates, if any. Give some thought to your arrival in relation to the other traffic.

A 737 isn't going to be able to follow a Piper Warrior on downwind; it's often safer to re-position and remain behind the jet. Make sure you know and follow CTAF radio procedures and let the other pilot know what you're doing. ■

What is ADS-B?

Automatic Dependent Surveillance – Broadcast, or ADS-B, is a system in which aircraft continually broadcast their position, velocity, identity and other information. A network of ATC ground stations receive these transmissions from aircraft and forward them for display on Air Traffic Control (ATC) consoles. Typically, ATC can use ADS-B information in the same way as radar.

What does ADS-B OUT and IN mean?

ADS-B OUT is the transmission of ADS-B information out from an aircraft to other aircraft or to the ground. ADS-B OUT has been made mandatory for IFR aircraft over an extended transition period. Compliance dates for ADS-B OUT depend on whether the aircraft flies in upper or lower airspace, is newly registered or existing, and whether it operates in areas of intensive air traffic in Western Australia.

ADS-B IN is the on-board reception of ADS-B OUT transmissions to allow a cockpit display of nearby aircraft to the pilot of the ADS-B IN equipped aircraft. There are no plans for the mandatory fitment of ADS-B IN.