

# CALLBACK

From NASA's Aviation Safety Reporting System



Issue 478

November 2019



Automatic Dependent Surveillance - Broadcast (ADS-B) equipment is a part of the FAA-led Next Generation Air Transportation System (NextGen) that is transforming all segments of aviation.<sup>1,2</sup> The equipment is *automatic* because it periodically transmits information with no pilot or operator involvement required. It is *dependent* because the position and velocity vectors are derived from the Global Positioning System (GPS) or other suitable Navigation Systems (i.e., FMS). It is called *surveillance* because it provides a method of determining 3-dimensional position and identification of aircraft, vehicles, or other assets. It is termed *broadcast* because equipment transmits the information available to anyone with the appropriate receiving equipment. ADS-B equipment is further designated as *in* or *out*. *In* refers to equipment that provides operators with weather and traffic position information delivered directly to the cockpit. *Out* refers to equipment that broadcasts information about an aircraft's GPS location, altitude, ground speed, and other data to ground stations and other aircraft, once per second.<sup>3</sup> Starting January 1, 2020, an aircraft must be equipped with ADS-B Out to fly in most controlled U.S. airspace.<sup>4</sup>

ADS-B information is plentiful. Sources include 14 CFR 91.225 and 91.227, Advisory Circular 114A Change 1, the Aeronautical Information Manual Chapter 4, and the FAA website.

ASRS has received reports relating to ADS-B. More issues and increased numbers are anticipated once the deadline passes. This month, *CALLBACK* shares reported incidents that involve ADS-B and exemplify enhanced safety. Subtle implications may portend some unintended benefits.

## First Indication of Conflict

For this C172 crew, ADS-B provided situational awareness with respect to unannounced traffic at a non-towered airport.

■ *While climbing on departure leg, my student noted traffic on the ADS-B screen, so... [the student] was already looking when I lifted the wing preceding a turn to left crosswind.... We saw the C182 at our 10 o'clock position, with nearly no lateral movement against the horizon, about 800 feet away. The student saw it first at about 800 feet distant, and yelled. I saw the aircraft at about 600 feet away and pushed the yoke hard. I estimate the other aircraft passed nearly overhead*

*and about 200 feet above us, slightly behind us, owing to the hard push we made on the yoke. The other aircraft (whose number we got from ADS-B) was not talking on frequency. Nobody else in the pattern heard him either. The other aircraft cruised through our pattern southbound, two to three hundred feet below pattern altitude. He was about 200 or so yards... closer to the... runway than... traffic usually turns crosswind. Had we not seen him, I believe he would have hit us.*

## Indisputable Flight Data

A C182 pilot in IMC observed conflicting traffic displayed in the cockpit. Maneuvering was required, and the ADS-B data later revealed the closeness of the encounter.

■ *We were IFR and level at 10,000 feet. We received an alert on the Avidyne Traffic System and also on Foreflight, which was running on an iPad. I advised the Controller that we had traffic showing at 9 o'clock near our altitude. [The Controller] advised us that they were going to pass 1,000 feet below us at 9,000 feet. We showed that the aircraft was still at 10,000 feet and getting very close (less than 1/2 mile). At that time we received an alert that showed the other aircraft was at our location and less than 100 feet below. We made an immediate 90 degree turn to the right... and climbed. As we were talking, another Controller came on and said that the other aircraft was descending. We advised ATC of the deviation and returned to our assigned course when the traffic was past us.*

*Upon landing, we were still not sure how close we were. We downloaded the ADS-B data from both aircraft and plotted them in Excel (we had the call sign from the traffic system and hearing ATC talk to them after). We were chilled to see just how close we had come. The ADS-B data shows that the Citation Jet began a descent, but then briefly leveled off at 10,000 feet (our altitude). Unfortunately this happened just as they were passing our location.*

## Practical Limitations

Many ADS-B targets were displayed while this pilot transitioned Class C airspace in VMC. The absence of any traffic advisory resulted in a false sense of security, but a threat still existed in close proximity to the aircraft.

■ *I was...on an Oakland transition through Class C airspace. I was given an instruction to fly from the Coliseum to the 30 numbers of Oakland at 2,000 feet.... I passed over the Coliseum and turned right to 30. Right before the handoff from North Tower to South Tower, an aircraft came directly head-on at my 12 o'clock and passed underneath me way too close – probably 100 to 200 feet. I was never given a traffic advisory or any info about this aircraft, even though I was in the middle of the Oakland Tower airspace pretty much right over the parallel runways. My guess is [the other aircraft] was transitioning to the east, probably talking to the South Tower, but they didn't give the North Tower the memo. Very disconcerting. ADS-B wasn't too helpful there, because I was right over the airport and there were a lot of targets on the ground and in the air, so it was hard to make any sense of the traffic scope with the targets overlapping. I was about to notify Tower of the close encounter, but was then given another target at my 12 o'clock, but this time ahead of me and headed in the same direction over the bay. I focused on flying the airplane and [continued to my destination].*

## What You Can't See Could Hurt

A potential conflict was observed on the cockpit ADS-B display. After the hazard developed and without visual contact, this Cherokee pilot used ADS-B data and FAR 91.3 authority to increase separation and mitigate the threat.

■ *While being vectored for the RNAV... approach, I was instructed to descend to 6,000 feet. During the descent I... saw a potential conflict on my ADS-B traffic display. ATC also called the traffic, but I was unable to make visual contact. The traffic was approximately 12 o'clock at 2 miles, maintaining altitude about 400 feet below us. I stopped my descent at about 6,200 feet. I still didn't have visual contact and informed ATC. The traffic began to climb directly toward us (according to the ADS-B display, which then issued a conflict alert). I took evasive action by turning right and initiating a climb.*

*Strangely, the traffic turned in the same direction and continued to climb directly toward us. ADS-B showed 100 feet separation, directly below us. I went to a full-power climb and continued into a 360 degree turn. I informed ATC I was doing so. Thankfully the traffic broke off its turn, and the conflict was resolved without incident. I never saw the traffic and assume [they] never saw me.*

*I resumed the approach and landed without incident. I was surprised that, other than an initial traffic call, ATC provided no assistance in resolving the conflict. I believe I was in*

*Class B airspace at the time, but did not hear the Controller talking to the [conflicting] aircraft.*

## Safer and More Efficient

A conflict could have been eased or averted if a VFR flight outside Class D airspace had coordinated with ATC. The Controller used ADS-B data to identify the aircraft and subsequently offered the reader some sage advice.

■ *I noticed a 1200 code [Aircraft Y] transitioning from north to south, east of the Class D. Aircraft X was inbound for [Runway] 30R, and I was trying to determine where Aircraft X would fit inbound with my other traffic. As Aircraft X approached the airport, it appeared they needed to descend out of 8,000 feet, but there was [other IFR] traffic near them on the approach at 7,500 feet. Eventually, after...Aircraft X had to level off before turning inbound, the Approach Controller was able to switch [Aircraft X] to me, and he checked on, reporting that he had the [southbound, VFR] traffic in his proximity in sight.... I asked if the pilot could tell what type of aircraft it was, [which] he [provided].*

*When traffic permitted, I was able to check and determine from ADS-B that the call sign of the 1200 target was Aircraft Y. A few minutes later, the Approach Controller called with a request to turn Aircraft Z into the Class D to avoid [Aircraft Y] as well. I approved the request. Aircraft Y appeared to continue out of the area.*

*This is another instance of an aircraft flying perfectly legally just outside of controlled airspace, yet causing traffic conflicts with aircraft utilizing the Air Traffic System. The Air Traffic System worked as intended (collisions avoided), but it would have been safer and more efficient if the transitioning aircraft was in contact with Air Traffic Control. They could have received flight following from Approach or contacted... Tower to...transition or advise their intentions.*

*My recommendation is to continue to encourage pilots to take advantage of Air Traffic Control services, even if it is to simply advise as a courtesy that they are transitioning nearby controlled airspace. It may be helpful to remind pilots at local events, through online materials, and even provide suggestions on aviation charts (e.g. frequencies for traffic advisories from Approach or towers). In hindsight, I wish I had called in the blind to see if the aircraft was on frequency.*

1. <https://www.faa.gov/nextgen/faqs/#q1>
2. <https://www.faa.gov/nextgen/programs/adsb/>
3. [https://www.faa.gov/nextgen/equipadsb/capabilities/ins\\_outs](https://www.faa.gov/nextgen/equipadsb/capabilities/ins_outs)
4. <https://www.faa.gov/nextgen/equipadsb/>

ASRS Alerts Issued in September 2019	
Subject of Alert	No. of Alerts
Airport Facility or Procedure	1
ATC Equipment or Procedure	1
<b>TOTAL</b>	<b>2</b>

478  
 A Monthly Safety  
 Newsletter from  
**The NASA  
 Aviation Safety  
 Reporting System**  
 P.O. Box 189  
 Moffett Field, CA  
 94035-0189  
<https://asrs.arc.nasa.gov>

September 2019 Report Intake	
Air Carrier/Air Taxi Pilots	5,094
General Aviation Pilots	1,426
Flight Attendants	768
Controllers	489
Military/Other	304
Mechanics	235
Dispatchers	135
<b>TOTAL</b>	<b>8,451</b>